

R.C.U.S.

A Guide
OF THE
Dissection of the Human Body
FOR THE USE OF STUDENTS
IN THE ANATOMICAL LABORATORY
OF THE
University of Toronto



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PREFACE.

It is not intended that this Guide should in any way take the place of a text-book of Anatomy, but that it should be rather a topographical index, giving the Student a list of the structures he should find in any given region of the body and the procedure to be adopted for exposing them. For a description of them he is referred to one of the standard text-books, which should be constantly used in connection with the Guide.

For the purpose in view the body is supposed to be divided into two halves at the level of the diaphragm, and each half is treated in fifteen demonstrations. Each structure mentioned in each demonstration should be exposed and cleaned and the description given of it in the text-book should be read and compared with the actual finding. It is not sufficient that the structure should be merely exposed; it should be carefully and thoroughly *dissected out*, not only for the purpose of obtaining a clear and definite idea of it, but also as a part of the training in carefulness and thoroughness which it is the business of every Student of Medicine to acquire.

The Student will find that his work will be greatly facilitated if he can have constant access to one of the better atlases of Anatomy, such as those of Spalteholz, Toldt or Sobotta. And, furthermore, he will find it to his advantage to obtain some knowledge of the development of the part he is studying, not only because by so doing the significance of the structure and relations of the part becomes intelligible, but also as a part of his training. For the practice of Medicine demands besides careful observation of things as they actually exist, a correct understanding of the causes that have brought about the observed conditions, and the sooner the Student begins to train himself in the combination of these two essentials the better it will be for him.

In order that the dissection may be properly carried out it is imperative that the Student should take due care of the subject assigned to him. Slovenly methods have no place in a dissecting room, and in no way are such methods more clearly shown than by a lack of cleanliness on and about the dissecting table and by carelessness in the protection of the subject. One of the greatest dangers that has to be contended against is the drying out of the parts, especially the head and limbs, and the Student must be

constantly on his guard to prevent this, for once a part has been allowed to become dried it can never be restored to a perfectly satisfactory condition. The best available protective is the skin of the cadaver and when it has been dissected off it should always be kept and used as a covering for the part when the day's work is completed. The limbs should be unwrapped from time to time and the wrappings moistened and replaced, and the judicious application of vaseline will also be of service. At the close of each day's work the Student should see to it that the part at which he has been working is properly and efficiently covered, and even during the working hours the parts not in actual use should be kept covered.

In the choice of instruments there is a wide range, but it will be found to be false economy to purchase any but those of the best steel. As a minimum two scalpels, a pair of forceps, a blunt dissection probe, one curved surgical needle and a small oilstone or one of carborundum will be required. To these may be added with advantage an additional scalpel or two, a pair of medium-sized scissors and a blowpipe. Other instruments that may be required, such as bone forceps, saws, etc., will be found in the laboratory. The scalpels should have bellied blades and one should be of medium size and the other somewhat larger, what is known as a cartilage knife. If additional scalpels are desired, one should be straight-edged for use in the finer dissections. The probe will be found to be a most useful instrument, indeed, a great portion of the dissection may be advantageously performed with it. The forceps should have well-toothed points, which should come together almost by the weight of the finger; stiff forceps are to be carefully avoided.

The Student will find it to his advantage to make drawings of the parts dissected, showing the principal structures in each region on a scale sufficiently large to clearly bring out all that it is desired to represent.

Finally it may be stated that in compiling this Guide much assistance has been obtained from several of the excellent works of a similar nature that have appeared within recent years, and especially from Cunningham's Manual of Practical Anatomy and Barker's Laboratory Manual of Anatomy.

INTRODUCTORY

Before beginning the actual dissection of the body it is advisable that the student should have a general knowledge of the framework by which the soft parts are supported and protected. This framework or *skeleton* consists of a large number of elements and with a prepared skeleton before him the student should note the following points, the more detailed study of the various bones being left until a later stage of the course.

The skeleton may for convenience be regarded as consisting of two portions. 1. The *axial skeleton*, forming the framework of the trunk and consisting of the skull and the vertebral column together with the ribs (*costae*) and the sternum. 2. The *appendicular skeleton* consisting of the framework of the limbs.

THE AXIAL SKELETON.

The VERTEBRAL COLUMN consists of a number of bones, the *vertebrae*, each of which consists of a ventral disklike portion the *body* or *centrum*, with the dorsal surface of which a bony arch is fused. The uprights of the arch are known as the *pedicles*, while its roof is formed by the *laminae*, which are produced dorsally into a *spinous process*. From the junction of the pedicle and lamina on each side a *transverse process* extends laterally and, in the lower vertebrae, there are also on each side a *superior* and an *inferior articulating process*. The space bounded by the body and arch is the *vertebral foramen* and when the vertebrae are in position the various foramina form the *spinal (vertebral) canal* which contains the spinal cord, the nerves of which make their exit through the intervals between successive pedicles, these intervals being known as the *intervertebral foramina*.

Five well-marked groups of vertebrae may be recognized.

1. The *cervical* group, composed of seven vertebrae, in each of which a rudimentary rib is fused at one end with the body and at the other with the tip of the transverse process, so that the transverse processes appear to be perforated, the vertebral artery passing through the perforations. There are no distinct articulating processes, the articulating facets being borne by the

laminae, and the spinous processes are short and covered in by the ligamentum nuchae except in the case of the seventh, which is consequently termed the *vertebra prominens*, its spinous process being the first that can be distinctly felt. The first vertebra is known as the *atlas* and the second as the *axis*; their peculiarities will be studied later on.

(Note that the rib element of the seventh vertebra sometimes remains separate and may grow to some size forming a supernumerary rib.)

2. The *thoracic* set, consisting of twelve vertebræ, whose corresponding ribs articulate with their vertebræ and are quite separate from the transverse processes. The articulating processes are more developed than in the cervical set and the spinous processes are long and inclined downward so that they overlap.

3. The *lumbar* set, consisting of five vertebræ, in which rudimentary ribs are completely fused with the transverse processes, no foramen occurring; indeed, the main portion of the apparent transverse process is formed by the rib rudiment, so that it is also termed the *costal process*. The spinous processes are broad and do not overlap; the articulating processes are well developed and interlock firmly.

(Note that the rib rudiment of the first lumbar vertebra may sometimes remain separate as a supernumerary rib.)

4. The *sacrum*, consisting of five vertebræ fused together to form a solid mass. Rudimentary ribs corresponding to the upper three or four unite with each other and with the transverse processes, forming what are termed the *lateral masses*, which laterally bear an ear-shaped facet for articulation with the iliac bones. Note the indications of the various processes, etc., on each of the constituent vertebrae.

5. The *coccyx*, consisting of three or four rudimentary vertebræ fused together.

In the natural condition successive vertebral bodies are united together by fibrocartilaginous *intervertebral disks*, and in addition strong *anterior* and *posterior longitudinal ligaments* extend the entire length of the column, uniting the bodies, while *subflavan ligaments*, rich in elastic fibres, extend from lamina to lamina. Note on the skeleton the curvatures of the column.

The RIBS are arranged in twelve pairs, the rudimentary ones fused with the cervical, lumbar and sacral vertebrae being omitted. A typical rib consists of a *head*, which articulates with an intervertebral disk and the edges of the bodies of the adjoining vertebrae; a *neck*; a *tubercle*, which articulates with the transverse process of a vertebra, and a flat, curved *shaft* or *body*. The curvature of the shaft is most pronounced a little beyond the tubercle forming the *angle* of the rib and at this point a slight torsion of the shaft also occurs. At its ventral end the shaft passes into the *costal cartilage*.

Three groups of ribs are usually recognized. (1) The *true ribs*, consisting of the first seven pairs and characterized by their costal cartilages articulating with the sternum; (2) the *false ribs*, the eighth to the tenth pairs, whose costal cartilages are attached in succession to the cartilage of the next highest rib; (3) the *floating ribs*, the eleventh and twelfth pairs, whose cartilages are not attached, the ribs ending freely in the musculature of the body wall.

Note that each typical rib is attached at three points, at the head to the vertebral bodies, at the tubercle to the transverse process and ventrally to the sternum.

The STERNUM is a flat bone composed of three portions. The upper part is the *manubrium* and is united with the body at a more or less pronounced *angle*, which is opposite the points of attachment of the second pair of ribs. The first ribs also unite with the manubrium and its upper angles are occupied by facets for the articulation of the clavicles. The *body* has attached to its sides the remaining true ribs. It terminates in the *xiphoid process*.

The sternum, ribs and thoracic vertebrae form what is termed the *thorax*. Note the form of the inlet and outlet of the thoracic cavity.

The SKULL consists of an upper portion, the *cranium*, which contains the brain, and a lower anterior *facial region*. Each of these portions consists of a number of bones united together by sutures, except in the case of the mandible.

THE SKULL FROM ABOVE. Examine the skull from above and note the *coronal suture* passing across it transversely and

the *sagittal suture* extending backwards from the coronal in the middle line. The bone in front of the coronal suture is the *frontal*, those on either side of the sagittal suture are the *parietals*. Trace the sagittal suture backwards and note that it terminates in the *lambdoid suture*, separating the parietal bones from the *occipital*.

THE SKULL FROM THE SIDE. Examine the skull from the side. Note a downwardly directed process of the frontal bone, the *zygomatic process*, which articulates with a process of the *zygomatic bone* to form the lateral margin of the orbit. The posterior border of the zygomatic process of the frontal is continued as a curved line over the surface of the frontal and parietal bones; this *temporal line* marks the attachment of the upper border of the temporal muscle and the strong fascia covering it and the area bounded by the line in front, above and behind is termed the *temporal fossa*. The floor of the lower part of the temporal fossa is formed anteriorly by the temporal surface of the *great wing* of the *sphenoid* and posteriorly by the *squamous portion* of the *temporal bone*. The region where the great wing of the sphenoid articulates with the anterior inferior angle of the parietal is termed the *pterion*; the suture between the squamous portion of the temporal and the lower border of the parietal is the *squamous suture*.

The squamous portion of the temporal is continuous below and behind with the *mastoid portion*, which sends downward a blunt projection, the *mastoid process*. This contains numerous cavities, the *mastoid cells*, which communicate with the tympanic cavity and thence through the tuba auditiva (Eustachian tube) with the pharynx. Immediately in front of the mastoid process is the *external auditory meatus*, bounded on three sides by the *tympanic portion* of the temporal, while its upper boundary is formed by the root of a long slender *zygomatic process*, which extends forward to articulate with the zygomatic bone. On the under surface of this process, immediately anterior to the external auditory meatus is the *mandibular (glenoid) fossa*, whose anterior part receives the head of the mandible, and is bounded in front by a convex articular area, the *articular tubercle* or *eminence*.

The *zygomatic bone* has a somewhat quadrangular outline. It articulates posteriorly with the zygomatic process of the temporal, above by its *frontal process* with the zygomatic process of the frontal, and anteriorly with the body of the maxilla. It forms part of the lateral and inferior borders of the orbit.

The *maxilla* bears the upper teeth and forms the inferior border of the orbit, while its *frontal process*, which extends upwards to articulate with the frontal bone, forms at the same time the medial border of the orbit and a portion of the lateral wall of the nasal cavity. The body of the bone contains a large cavity the *maxillary sinus (antrum)*, which communicates with the middle meatus of the nasal cavity. Below the inferior border of the orbit is a large foramen, the *infraorbital foramen*, which transmits the infraorbital vessels and nerve. The *nasal bone* is a small, flat, oblong bone which articulates laterally with the frontal process of the maxilla and medially with its fellow of the opposite side, the two bones forming the bridge of the nose.

Remove the mandible and note a plate of bone descending from the under surface of the sphenoid, the *external pterygoid plate* of the sphenoid. Its lateral surface gives origin to the external pterygoid muscle and its anterior border articulates in its lower part with the palatine bone, but in its upper part is separated from the body of the maxilla by a narrow slit-like interval, the *pterygo-maxillary fissure*. The region between the zygomatic bone laterally and the maxilla and external pterygoid plate medially is known as the *zygomatic fossa*: it communicates widely with the temporal fossa above and has the pterygo-maxillary fissure on its inner wall.

Replacing the mandible, note that it consists of a horizontal *body*, which carries the lower teeth, and an almost vertical *ramus*. The two halves of the body are firmly fused in the median line the line of union being the *symphysis*. A small *mental foramen* is to be seen on the lateral surface of the body, giving passage to the mental branches of the inferior alveolar nerve and vessels. The region where the lower border of the body and the posterior border of the ramus meet is termed the *angle* of the mandible and is more or less roughened for the insertion of the masseter muscle which has its origin from the zygomatic arch. The

upper posterior angle of the ramus terminates in the *head* of the mandible, which is supported by a short *neck* and articulates with the mandibular (glenoid) fossa of the temporal. The upper anterior angle is prolonged into a triangular *coronoid process* into which the temporal muscle inserts, and the notch between this process and the head is termed the *mandibular notch* and allows of the passage of a nerve and blood-vessels to the masseter muscle.

THE INNER SURFACE OF THE SKULL. Remove the upper part of the cranium and examine the floor of the brain-case. Note that the level is different in different regions. The highest part is situated anteriorly and is known as the **ANTERIOR FOSSA**. The greater part of the floor of this is formed by the *orbital plates* of the frontal which also form the roof of the orbit. They are separated in the middle line by a broad notch which is occupied by the *ethmoid* bone, of which, however, only a small portion is visible. It shows in the median line a sharp triangular elevation, the *crista galli*, on either side of which is a narrow perforated plate, the *cribriform plate* (*lamina cribrosa*), through the perforations of which the olfactory nerves pass. The posterior part of the floor of the anterior fossa is formed by the anterior part of the *body* of the sphenoid in the middle line and on each side of this by a triangular *lesser wing* of the sphenoid, whose posterior angle forms a marked prominence known as the *anterior clinoid process*. The body of the sphenoid is hollow, usually containing two cavities separated by a vertical septum. The cavities communicate with the nasal cavity above the superior concha.

The **MIDDLE FOSSA** has for its floor in the middle line a portion of the body of the sphenoid, which presents anteriorly a transverse groove, the *optic groove*, which lodges the optic commissure and terminates at either end in the *optic foramen*, this giving passage into the orbit to the optic nerve and ophthalmic artery. Posterior to the optic groove is a deep depression, the *sella turcica* (*fossa hypophyseos*) which lodges the pituitary body (hypophysis); the projecting angles of the posterior wall of the sella are termed the *posterior clinoid processes*.

The lateral portions of the floor of the middle fossa are

formed on each side by the cranial surfaces of the great wing of the sphenoid and of the squamous portion of the temporal, while more posteriorly it is formed by the sloping anterior surface of a pyramidal mass of bone directed forwards and inwards; this is the *petrous portion* of the temporal and contains in its interior the internal ear.

Note on either side of the sella turcica on the root of the great wing of the sphenoid a broad but shallow groove directed antero-posteriorly, the *groove for the cavernous sinus*. Traced forward this groove will be found to lead to a fissure between the edges of the greater and lesser wings of the sphenoid, the *superior orbital fissure*, which gives passage into the orbit for the nerves to the muscles of the eyeball and to the ophthalmic division of the trigeminus, as well as the ophthalmic veins. Posteriorly the groove leads to a somewhat irregular foramen, the *foramen lacerum*, bounded by the body and wing of the sphenoid and the apex of the petrous portion of the temporal. Anteriorly in the great wing of the sphenoid note the *foramen rotundum* for the exit of the maxillary division of the trigeminal nerve; posterior to this the *foramen ovale* for the mandibular division of the trigeminal; and still more posteriorly at the posterior angle of the great wing, which is called the *spine of the sphenoid*, the *foramen spinosum*, through which the middle meningeal artery enters the cranial cavity. Note the grooves for the branches of this artery, posterior branches extending laterally and posteriorly over the squamous portion of the temporal and a strong anterior branch passing over the great wing of the sphenoid and over the anterior inferior angle of the parietal, therefore, over the pterion.

On the anterior surface of the petrous portion of the temporal note the small *hiatus Fallopii* for the great superficial petrosal nerve on its way to the foramen lacerum; near the apex of the bone a shallow depression for the lodgement of the semilunar ganglion of the trigeminal nerve; and at the apex of the bone the orifice of the *carotid canal*, by which the internal carotid artery enters the cranial cavity.

The floor of the POSTERIOR FOSSA is formed almost entirely by the occipital bone, and presents a large oval opening, the

foramen magnum, through which the spinal cord joins the brain. Laterally, however, the mastoid portion of the temporal and the posterior surface of the petrous portion enter into the boundaries of the fossa. Anteriorly to the foramen magnum its floor is formed by the posterior part of the body of the sphenoid and the *basilar process* of the occipital, these two bones being fused together in the adult. A *groove for the inferior petrosal sinus* lies on the line of junction of the apex of the petrous with the basilar process and if this groove be traced backward it will lead to the *jugular foramen* which gives exit to the glossopharyngeal, pneumogastric (vagus) and spinal accessory nerves and forms the starting point of the internal jugular vein. On the posterior surface of the petrous note the *internal auditory meatus*, which transmits the facial and auditory nerves, and in the anterior part of the boundary of the foramen magnum the *hypoglossal foramen*, which transmits the hypoglossal nerve.

On the portion of the occipital posterior to the foramen magnum (the *squamous portion*) note the *internal occipital protuberance* and descending from above to the right of this a *groove for the superior longitudinal sinus*. Passing laterally on either side is a *groove for the transverse sinus*, which passes from the occipital over the posterior inferior angle of the parietal and then curves medially over the mastoid portion of the temporal to the jugular foramen where it unites with the inferior petrosal sinus to form the internal jugular vein.

THE SKULL FROM BELOW. Examine now the skull from below, the mandible being removed. Note anteriorly the arch formed by the teeth, borne on the *alveolar processes* of the maxillae. Filling in the arch is the *hard palate*, separating the mouth from the nasal cavities and formed on its anterior two-thirds by the *palatine processes* of the maxillae, which meet in the middle line except just behind the incisor teeth, where there is the *incisive foramen*. The posterior part of the palate is formed by the *horizontal portions* of the *palate bones*, which also meet in the middle line, and on either side, where they are in contact with the maxillae, is the *greater palatine foramen*, which transmits to the palate the descending palatine artery and the anterior palatine nerve.

Above the posterior borders of the palate bones note the large *posterior nares* (*choanae*) separated by a thin plate of bone, the *vomer*.

The lateral boundary of each choana is formed by the *perpendicular portion of the palate bone*, whose lateral surface is closely applied to the medial surface of the body of the maxilla. Projecting medially will be seen the posterior end of a thin curved plate of bone, the *inferior concha*, and above it a second similar plate, the *middle concha*, which is a part of the lateral mass of the ethmoid. Above this again is a *superior concha*, also a part of the lateral mass of the ethmoid, but it cannot readily be seen without further preparation of the skull. The space between the under surface of the inferior conchæ and the palate is termed the *inferior meatus* of the nose; that between the middle and inferior conchæ, the *middle meatus*; and that between the superior and middle conchæ, the *superior meatus*.

The lateral masses of the ethmoid contain numerous small cavities, the *ethmoid cells*, which communicate with the superior and middle meatus of the nasal cavity.

In close apposition to the posterior ends of the alveolar process note again the external pterygoid plate of the sphenoid and medial to this a similar *internal pterygoid plate*, which terminates in a hook-shaped process, the *hamular process*, around which the tendon of the tensor palati muscle plays. The two pterygoid plates of each side are united above, but below they separate, the *tuberosity* of the palate bone filling up the gap. The fossa bounded by the two plates and the tuberosity is known as the *pterygoid fossa* and is occupied mainly by the origin of the internal pterygoid muscle.

Posteriorly to the pterygoid plates one sees the posterior part of the great wing of the sphenoid with the oval and spinous foramina and the downwardly directed spine. Where the pterygoid processes join the root of the greater wing note the posterior opening of the *pterygoid canal*, through which runs the great superficial petrosal nerve. Behind the sphenoid is the inferior surface of the petrous portion of the temporal, wedged in between the great wing and the occipital bone. At the apex of the petrous is the irregular foramen lacerum and slightly

lateral to this the inferior opening of the carotid canal. Parallel with the suture between the great wing and the petrous there is in the latter bone the *tuba auditiva* (*Eustachian tube*), whose anterior end may be seen. Between the petrous and the occipital bones is the jugular foramen and lateral to this is the tympanic portion of the temporal which forms the floor and sides of the external auditory meatus, and partly encircles the base of a strong downwardly directed process, the *styloid process*. Posteriorly, at the root of this process, is the *stylomastoid foramen* which gives exit to the facial nerve and is so named from its position between the styloid and mastoid processes. Note on the medial surface of the mastoid process a deep *digastric groove* for the origin of the posterior belly of the digastric muscle, and more medially and parallel to this a slighter groove for the occipital artery.

Between the apices of the two petrous bones is the basilar process of the occipital and behind this the foramen magnum, at the sides of the anterior part of which are the *occipital condyles*, for articulation with the atlas vertebra. The portion of the occipital behind the foramen magnum is termed the *squamous portion* and it bears a strong prominence at about its centre, the *external occipital protuberance*, also termed the *inion*, to which the ligamentum nuchae is attached. From it a curved line, the *superior nuchal line*, extends laterally on each side, and between this and the foramen magnum is a less distinct *inferior nuchal line*. These lines are associated with the attachment of powerful muscles, the superior one giving origin medially to the trapezius and laterally to the sternomastoid.

Study now the inner surface of the mandible and observe on the ramus the *mandibular foramen*, which leads into a canal in the substance of the bone and gives passage to the inferior alveolar nerve and vessels which supply the lower teeth. Running downward and forward from the foramen is a slight groove, the *mylo-hyoid groove*, which lodges the mylo-hyoid vessels and nerve, and along the body of the bone will be seen a slight ridge, the *mylo-hyoid line*, to which the mylo-hyoid muscle is attached. The slight fossa below this line lodges the submaxillary gland and is the *submaxillary fovea*, while another shallow fossa anterior

to this and slightly above it is the *sublingual fovea*, lodging the sublingual gland. Below the sublingual fovea is the *digastric fossa* for the attachment of the anterior belly of the digastric muscle, and close to the symphysis and near its lower end are one or two small *genial tubercles* which often fuse with those of the other half of the bone to form the *mental spine*; they give attachment to the genio-hyoid and genio-glossus muscles.

THE SKULL FROM IN FRONT. Examine now the skull from in front and identify the parts already mentioned which may be seen in that view. Note in addition the anterior opening of the nasal cavities, the *pyriform aperture*, and in the median line the anterior edge of the bony *nasal septum*, formed in this part of its extent by the *perpendicular plate* of the ethmoid. Projecting medially from the lateral wall of the nasal cavity observe the anterior ends of the middle and inferior conchæ and of the middle and inferior meatus; the superior concha and superior meatus cannot be seen. The region of the frontal bone immediately above its articulation with the nasal is termed the *glabella*. On either side of this, the bone contains a cavity, the *frontal sinus*, which communicates with the middle meatus of the nasal cavity.

Identify the bones forming the margin of the orbit and in the upper margin note a notch or foramen, the *supraorbital notch*, through which pass the supraorbital vessels and nerve. At the bottom or apex of the orbit two foramina will be seen; the upper oval one is the optic foramen and the lower the superior orbital fissure. The roof of the orbit is formed mainly by the orbital plate of the frontal bone, a small portion toward the apex being formed by the lesser wing of the sphenoid. The outer wall is formed by the orbital surface of the great wing of the sphenoid together with the orbital surface of the zygomatic. The floor is formed by the orbital surface of the maxilla and extending forward from its posterior margin is a groove, the *infraorbital groove*, which soon becomes a canal and opens at the infraorbital foramen. At its posterior end the infraorbital groove opens into the *inferior orbital fissure*, which separates the lower edge of the great wing of the sphenoid from the orbital surface of the maxilla and opens posteriorly into a small cavity, the *sphenomaxillary (pterygo-palatine) fossa*, which intervenes between the root of

the pterygoid process behind and the posterior surface of the body of the maxilla anteriorly. This fossa also communicates medially by the *sphenopalatine foramen* with the nasal cavity; inferiorly through the *pterygo-palatine canal* with the greater palatine foramen; and laterally through the pterygo-maxillary fissure with the zygomatic fossa. On the posterior wall of the fossa is the foramen rotundum and the anterior end of the pterygoid canal.

The medial wall of the orbit is formed mainly by the *lamina papyracea*, the thin outer wall of the lateral mass of the ethmoid. Anterior to this is a thin scale-like bone, the *lachrymal*, upon whose surface is the *lachrymal groove*, which lodges the lachrymal sac and below, by the articulation of its margins with the frontal process of the maxilla, becomes converted into the *naso-lachrymal canal*, which opens into the inferior meatus of the nose and transmits the naso-lachrymal duct. Wedged in between the orbital surface of the maxilla and the posterior inferior angle of the lamina papyracea the minute *orbital process* of the palate bone may usually be seen.

The HYOID is a small bone imbedded in the muscles of the anterior part of the neck; its body can be readily felt in the living subject just above the thyreoid cartilage (Adam's apple). It consists of a body to which are attached *greater* and *lesser cornua*. The lesser cornu projects from the upper part of the body and is usually quite small; from its apex the stylohyoid ligament extends upwards to be attached to the styloid process. The greater cornua are larger and project horizontally backward.

THE APPENDICULAR SKELETON.

The appendicular skeleton in each limb consists of a portion by which the limb is united to the axial skeleton, the *girdle*, and the skeleton of the limb proper. The girdles of the upper and lower limbs are known respectively as the *pectoral* and *pelvic girdles*.

THE UPPER LIMB. The pectoral girdle consists of two bones, the *clavicle* anteriorly and the *scapula* posteriorly. Note that the girdle articulates with the axial skeleton only by the

connection of the medial end of the clavicle with the manubrium of the sternum; the scapula does not articulate with the axial skeleton.

The CLAVICLE is an elongated bone, curved somewhat like the italic letter *f*. Its medial or *sternal* end is rounded and is convex anteriorly, while its lateral or *acromial* end is flattened and concave anteriorly. By its sternal end it articulates with the manubrium of the sternum and by its acromial end with the acromial process of the scapula.

The SCAPULA is a triangular flat bone, one of its borders, the *vertebral border*, being almost vertical and parallel with the vertebral column; the *axillary border* is somewhat thickened and meets the vertebral border below to form the *angle*; the *superior border* is the third and shortest one and is almost horizontal. At the lateral angle is a large, oval, slightly concave articular surface, the *glenoid cavity*, with which the head of the humerus articulates; and arching forward over the cavity is a strong hook-shaped process of the superior border, the *coracoid process*. On the superior border just medial to the root of this process is the small but sharply defined *scapular notch* and a line drawn from the bottom of this over the ventral surface to the axillary border a little below the glenoid cavity and then back on the dorsal surface to the notch marks off what is termed the *neck* of the scapula. Crossing the dorsal surface of the scapula at approximately the junction of its upper and middle thirds is a strong ridge, the *spine* of the scapula. Commencing at the vertebral border it becomes gradually higher as it passes laterally and terminates in a strong flattened process, the *acromion process*. The spine divides the dorsal surface of the scapula into an upper, smaller *supraspinous fossa* and a lower larger *infraspinous fossa*. The ventral or *costal surface* is slightly concave, and forms what is termed the *subscapular fossa*.

The HUMERUS is the uppermost bone of the arm. The upper extremity bears an articular facet, the *head*, which is almost one-third of a sphere and looks upward and inward to articulate with the glenoid cavity of the scapula. It is separated from the shaft by a slight groove, the *anatomical neck*. Lateral to it is a strong *greater tuberosity* which has three facets on its upper

surface for the attachment of the supraspinatus, infraspinatus and teres minor muscles. In front of it is the *lesser tuberosity* for the attachment of the subscapular muscle. Between the two tuberosities is the *intertubercular groove*, which is continued downwards on the shaft and lodges the tendon of the long head of the biceps muscle. The region below the head and tuberosities is known as the *surgical neck*.

The shaft is nearly cylindrical above but becomes flattened below. On its outer surface near its middle is a rough marking, the *deltoid eminence*, for the attachment of the deltoid muscle, and a little below this a slight *groove for the radial nerve* can be seen on the posterior surface passing downwards and laterally. The sharp edges of the lower part of the shaft are the *lateral* and *medial supracondylar ridges*, each of which ends below in a well marked projection, the *lateral* and *medial epicondyles*. The lower extremity of the bone bears two articular surfaces which are really continuous; laterally there is a circular one, the *capitulum*, for articulation with the radius and medially one that is somewhat like an hour-glass placed on its side and is the *trochlea*, for articulation with the ulna. Above the trochlea on the posterior surface is a deep depression, the *olecranon fossa*, which receives the tip of the olecranon when the arm is extended; anteriorly is a smaller depression, the *coronoid fossa*, which receives the coronoid process when the arm is fully flexed and a very shallow depression, the *radial fossa*, may be seen above the capitulum, for the reception of the head of the radius in complete flexion.

The bones of the forearm are two in number, the *radius* laterally and the *ulna* medially.

The ULNA at its upper end has a strong pyramidal process, the *olecranon*, whose anterior surface is smooth for articulation with the trochlea of the humerus, this articular surface being continued forward upon a broad flat anterior projection, the *coronoid process*. Upon the lateral edge of this latter is a second concave articular surface, the *radial notch*, for the head of the radius. The shaft has a triangular section throughout the greater part of its length, but below it becomes much smaller and almost cylindrical. The sharp outer edge of the bone is the

interosseous ridge and gives attachment to the interosseous membrane which extends across the interval between the two bones. The lower end of the ulna consists of a rounded *capitulum*, which articulates with a triangular fibrocartilage interposed between it and the carpus, and medially and posterior to this there is a short *styloid process*.

The RADIUS in general form is the reverse of the ulna, being rather slender above and massive below. Its upper extremity is formed by the disk shaped *capitulum* (*head*), whose upper, slightly concave surface is in relation with the capitulum of the humerus, while its edge articulates with the radial notch of the ulna. The upper part of the shaft is cylindrical, that portion just below the capitulum being termed the *neck*, and below the neck on the medial surface is the strong *tuberosity*, into which the tendon of the biceps muscle is inserted. Below the tuberosity the shaft becomes triangular in section, the medial border being the sharp *interosseous ridge* for the attachment of the interosseous membrane. The lower extremity bears an articular surface indistinctly divided into two portions for articulation with the scaphoid and lunate bones of the carpus. On its medial surface is the *ulnar notch* for articulation with the lower end of the ulna and laterally it is produced downwards to form a thick, short *styloid process*.

THE CARPUS. Succeeding the lower extremities of the radius and ulna are the carpal or wrist bones, consisting of eight bones arranged in two rows of four each. The proximal or upper row is formed of the following bones named in order from the radial side. The *scaphoid* (*navicular*), *lunate*, *cuneiform* (*triquetrum*), and *pisiform*, the last being a small round bone resting upon the anterior surface of the cuneiform. The bones of the distal row are the *trapezium* (*greater multangular*), *trapezoid* (*lesser multangular*), *os magnum* (*capitate*) and *unciform* (*hamate*). Note on the palmar surface of the trapezium a well-marked ridge, the *tubercle*, and on the unciform a hook-shaped process, the *hamulus*; these elevations give attachment to the anterior annular ligament beneath which the tendons of the long flexor muscles pass into the hand.

THE METACARPUS. The skeleton of the palm of the hand is

formed by five more or less cylindrical bones known as the *metacarpals*, which are distinguished as the first, second, etc., counting from the radial side. Each consists of a *capitulum* or head at the distal end, a *shaft*, and a more or less quadrate *base*. Note the *styloid process* that springs from the posterior lateral angle of the third metacarpal.

THE PHALANGES. The skeleton of each of the four fingers is formed of three approximately cylindrical bones, named the *first*, *second* and *third* or *ungual phalanx*, the first being the most proximal. In the case of the thumb there are only two phalanges, the second being the unguinal phalanx. Note the expanded disk-like tips of the unguinal phalanges for the support of the pulp of the digits.

THE LOWER LIMB. The **PELVIC GIRDLE** is formed by a single bone, the *os innominatum* (*os coxæ*), which is firmly united with the sacrum behind and with its fellow of the opposite side in front. It consists of three portions, the *ilium*, the flat expanded upper portion; the *pubis*, below and anteriorly; and the *ischium*, below and posteriorly. The three portions, which in the child are separate and distinct bones, meet at the bottom of a deep hemispherical cavity, the *acetabulum*, seen on the outer surface of the bone. Below the acetabulum is an oval or almost triangular foramen, the *obturator foramen*, bounded by the pubis and ischium.

Examine first the outer surface of the bone. The upper border of the ilium is known as the *crest* and gives attachment to the muscles of the abdominal wall, among others. Anteriorly it is prolonged into a slight projection the *anterior superior spine* and a little lower is a second smaller projection, the *anterior inferior spine*. Similarly, posteriorly, there is a *posterior superior* and a *posterior inferior spine*. Below the posterior inferior spine and between it and the spine of the ischium is a deep notch, the *greater sciatic notch*. The surface of the ilium gives origin to the powerful gluteal muscles and upon it are three more or less pronounced lines that mark out the areas occupied by the three muscles. The *posterior gluteal line* is almost vertical and joins the crest at about the junction of its posterior fifth with the anterior four-fifths; the *anterior gluteal line* starts at the upper

border of the great sciatic notch and curves upwards and forward to join the crest somewhat posterior to the anterior superior spine; while the *inferior gluteal line* starts at the bottom of the great sciatic notch and curves forward to terminate just above the anterior inferior spine.

The pubic portion of the bone consists of a *body* which meets with its fellow of the opposite side in the middle line to form the *symphysis pubis*. From the upper end of this a ridge, the *pubic crest*, passes laterally to terminate in the *pubic spine* or *tubercle*. From the upper part of the body the *superior ramus* of the pubis passes laterally to join the ilium, the line of junction being usually elevated to form what is termed the *iliopectineal eminence*. The upper border of the superior ramus is termed the *pecten*; it forms the anterior part of the *terminal line*, which marks the upper boundary of the true pelvis. From the lower part of the body of the pubis the *inferior ramus* passes downward and backward to join the ramus of the ischium, forming with it the lower border of the obturator foramen.

The ischial portion consists of a *body*, which takes part in the formation of the acetabulum. From its upper part there projects backwards a well-marked *spine* which forms the lower boundary of the great sciatic notch. The lower part of the body is formed by the rounded *tuberosity*, which gives origin to the ham-string muscles and supports the body in the sitting posture. Between the tuberosity and the spine is the *lesser sciatic notch*; this and the greater notch are converted into foramina by the sacro-tuberosus and sacra-spinous ligaments, whose attachments are indicated by their names. From the lower part of the body the *ramus* of the ischium passes forward and upward to unite with the inferior ramus of the pubis.

The *acetabulum* receives in articulation the head of the femur. Note its hemispherical shape and the fact that its wall is incomplete below, the gap forming the *acetabular (cotyloid) notch*. Note further that the floor of the cavity above the notch is rough and nonarticular, the articular surface being a horse-shoe shaped area just within the margin of the cavity.

Turning now to the inner surface of the os innominatum note that the greater part of the iliac portion is smooth and concave,

giving origin to the iliacus muscle. Posteriorly however it presents below an *auricular surface*, which articulates with a corresponding surface on the lateral mass of the sacrum, and above this is a large rough area for the attachment of the exceedingly strong posterior sacroiliac ligament. Note the iliac portion of the linea terminalis passing downwards and forwards to join the pecten of the pubis. On the under surface of the inner end of the superior ramus of the pubis note a broad groove that leads to the upper part of the obturator foramen; this is the *obturator groove*, and it lodges the obturator vessels and nerve. The inner surface of the ischium presents no important parts that have not been mentioned.

The FEMUR or thigh bone has at its upper extremity a hemispherical *head*, which articulates in the acetabulum and in the centre of which there is a rough depression, the *fovea*, for the attachment of the ligamentum teres which springs from the non-articular portion of the floor of the acetabulum. The head is borne by the *neck*, which is oval in section and meets the shaft at an angle. Just where it joins the shaft there is laterally a strong process, the *great trochanter*, to which important muscles are attached, and at a slightly lower level there is on the medial surface the *lesser trochanter*. A slight ridge, the *intertrochanteric line*, passes obliquely across the anterior surface of the shaft between the two trochanters, and posteriorly there is a much more pronounced *intertrochanteric crest*, at about whose middle is a slight tubercle, the *quadrate tubercle*, into which the quadratus muscle inserts. At the junction of the neck and the medial surface of the great trochanter is the *trochanteric fossa* for the insertion of the external obturator muscle. The surface of the shaft is smooth in most of its extent but posteriorly it bears a strong longitudinal ridge, the *linea aspera*. This bifurcates at both its upper and lower end; the lateral limb of the upper bifurcation is usually especially strong for the insertion of the gluteus maximus muscle and is termed the *gluteal ridge*. Medial to the upper part of this is a much fainter line, the *pectineal line*, for the attachment of a similarly named muscle. Between the two limbs of the lower bifurcation is a flat triangular area known as the *popliteal surface*; the inner limb

of the bifurcation terminates in a usually slight *adductor tubercle*.

At its lower end the femur enlarges and is formed mainly of two massive processes, the *medial* and *lateral condyles*, whose lower surfaces form the articular surfaces for the tibia. Posteriorly the two condyles are separated by a deep *intercondylar notch*; anteriorly they are not distinctly separated and their articular surfaces are united by an area, the *patellar surface*, with which the patella articulates. The whole articular surface has therefore the form of a horseshoe curved on the flat. Note that when the shaft is held vertical the medial condyle extends to a somewhat lower level than the lateral one, but when the bone is given the inclination that it naturally possesses the two condyles are at the same level.

The PATELLA is a small, broadly oval bone, somewhat flattened from before backwards. Its posterior surface is almost entirely articular, articulating with the patellar surface of the femur. Its upper border receives the insertion of the quadriceps extensor muscle of the thigh and its lower border, which is somewhat pointed, gives origin to the patellar ligament.

The TIBIA is the medial and larger of the two bones of the lower leg. Its upper extremity is expanded and bears on its upper surface two oval articular surfaces for the condyles of the femur, the portions of the bone that bears these surfaces being termed the *medial* and *lateral condyles*. The lateral surface is almost circular in shape and the medial one oval; between the two is a band-like portion of the surface which is non-articular and at about the middle of this there is a conical eminence, the *intercondylar eminence (spine of the tibia)*, whose apex is usually divided into two tubercles. On the under surface of the lateral condyle, towards its posterior part, there is an articular surface for the head of the fibula and from the neighbourhood of this an *oblique (popliteal) line* extends downwards and medially across the posterior surface of the shaft. On the anterior surface just below the condyles is a large tubercle, the *tuberosity*, into which the patellar ligament is inserted.

The shaft of the tibia is almost triangular in section, its anterior and lateral borders being especially sharp. The lateral

border gives attachment to the interosseous membrane and at its lower end bifurcates to enclose a rough triangular area, the *fibular notch*, to which the ligaments uniting the lower ends of the tibia and fibula are attached. The lower extremity of the tibia has an articular surface for the talus and its medial portion projects downwards as a strong process, the *medial malleolus*.

The FIBULA is the lateral bone of the lower leg and is very slender compared with the tibia. Its upper extremity forms a *head*, which bears a facet for articulation with the under surface of the lateral condyle of the tibia and its upper posterior part is produced upwards into a short *styloid process (apex)*. The shaft is marked by a number of vertical lines which mark out areas for the attachment of muscles. The lower extremity forms the *lateral malleolus*, upon whose medial surface is a facet for articulation with the lateral surface of the talus and above this there is a rough area for the attachment of the tibio-fibular interosseous ligament.

The TARSUS. The tarsal bones are seven in number. They are larger and less regularly arranged than the carpals. Below the tibia is the *talus (astragalus)*: its posterior portion is the *body* and projecting forward and medially from this is the *neck*, which bears at its extremity the rounded *head*, articulating with the navicular. Upon the upper surface of the body is the *trochlear surface* for articulation with the tibia; it is prolonged downwards on either side of the body to furnish articulating surfaces for the medial and lateral malleoli. Below the bone presents three articular surfaces for the calcaneus and between the two anterior and the posterior is a rough groove for the attachment of the talo-calcaneal interosseous ligament.

Lying below and somewhat lateral to the talus is the *calcaneus* or heel bone, at the posterior end of which is the *tuber calcanei*, which forms the projection of the heel and gives insertion to the strong tendo Achillis (calcanei). The upper surface presents anteriorly three facets corresponding with those on the inferior surface of the talus. The posterior one is limited anteriorly by a roughened groove, which, together with the corresponding groove on the talus forms the *sinus tarsi*, occupied by the strong talo-calcaneal interosseous ligament. The medial

facet is on the upper surface of a strong bracket-like projection of the medial surface of the bone, the *sustentaculum tali*. The anterior extremity bears an articular facet for the cuboid.

The *navicular* is a flattened, oval bone situated anteriorly to the talus, its posterior surface forming a concave articular surface for the head of that bone. Anteriorly it articulates with the three cuneiform bones. From its inferior and medial portion a rough *tuberosity* projects downwards. Anterior to the navicular are the three *cuneiform bones*, named the first (internal), second (middle) and third (external); the third also articulates in part with the cuboid. Anteriorly the three bones articulate with the first, second and third metatarsals respectively. The seventh bone is the *cuboid*, situated anterior to the calcaneus and articulating anteriorly with the fourth and fifth metatarsals. On its inferior surface is a distinct groove bounded posteriorly by a ridge; the groove is the *peroneal groove* and lodges the tendon of the peroneus longus muscle. On its medial surface the cuboid articulates with the third cuneiform.

The METATARSUS. The *metatarsal* bones are five in number and are named first, second, third, etc., beginning with that on the medial side of the foot. Each consists of an approximately cylindrical *shaft*, a rounded distal extremity or *head* and a more or less triangular *base*. The outer angle of the base of the fifth is prolonged outwards and downwards as the *tuberosity*.

The PHALANGES. The skeleton of the four outer toes is formed of three approximately cylindrical bones named the *first*, *second* and *third* or *ungual phalanges*, the first being the most proximal. In the case of the great toe there are only two phalanges, the second being the unguinal phalanx, and occasionally this is apparently the case with the little toe owing to a fusion of the unguinal and second phalanges. Note the expanded disk-like tips of the unguinal phalanges for the support of the pulp of the digits.

DISSECTION OF THE UPPER HALF OF THE BODY.

DEMONSTRATION I.

The Side of the Neck

The body lying on its back, place a block beneath the shoulders so that the head inclines backward, stretching the front of the neck.

SURFACE EXAMINATION.

Trace the lower margin of the mandible and, further back, note the mastoid process.

Note the position of the hyoid bone and its superior cornu. Below this the thyreoid cartilage of the larynx.

Still lower the cricoid cartilage.

Outline the sterno-cleido-mastoid muscle and note that it divides the side of the neck into two triangles, an anterior and a posterior.

Note the jugular (suprasternal) fossa in the middle line of the neck, between the sternal ends of the clavicle.

Press deeply with the finger just anterior to the anterior border of the sterno-cleido-mastoid on a line with the cricoid cartilage and feel the prominent anterior tubercle of the transverse process of the sixth cervical vertebra—the carotid tubercle.

Make an incision through the skin along the median line of the neck from the symphysis of the mandible to the manubrium sterni. From the lower end of this make a second incision extending laterally along the clavicle to the acromion, and from its upper end a third, extending along the lower border of the mandible to the tip of the

mastoid process. Reflect laterally the flap of skin thus outlined, exposing the

Superficial fascia

Platysma—Note the course of its fibres; examine its origin, insertion, nerve-supply, etc.

Reflect the platysma from below upwards, being careful not to injure the veins (external and anterior jugular) and nerves (superficial branches of the cervical plexus and especially the cutaneus colli and supraclavicular nerves) that lie immediately below it. Examine

External jugular vein; note its connection with the posterior auricular and anterior facial veins

Anterior jugular vein.

Note about midway along the posterior border of the sternocleido-mastoid muscle the emergence of the superficial branches of the cervical plexus. Trace them out.

Great auricular

Lesser occipital

Cutaneus colli (Superficial cervical)

Supraclavicular

Anterior (Suprasternal)

Middle (Supraclavicular)

Posterior (Supra-acromial).

A little below the angle of the mandible find the cervical branch of the facial nerve. Examine the

Superficial layer of the deep fascia of the neck

Sterno-cleido-mastoid muscle.

THE POSTERIOR TRIANGLE.

Examine its boundaries. Note the posterior belly of the omohyoid muscle extending obliquely across it a short distance above the clavicle and dividing it into an Occipital and a Supraclavicular (Subclavian) triangle.

THE OCCIPITAL TRIANGLE.

Examine its boundaries and its floor. Note among its contents, in addition to the first portions of the superficial branches of the cervical plexus, the following:

Spinal accessory nerve

Branches from the third and fourth cervical nerves to the trapezius muscle

Transversa colli and Superficial cervical arteries and veins
Proximal portions of the Brachial plexus.

THE SUPRACLAVICULAR TRIANGLE.

Examine its boundaries and note among its contents the

Third portion of the Subclavian artery

Subclavian vein

Transverse scapular (Suprascapular) artery and vein

Proximal portion of the Brachial plexus.

DEMONSTRATION II.

The Anterior Triangles of the Neck.

THE ANTERIOR TRIANGLE.

Examine its boundaries and identify in it the superior belly of the Omohyoid muscle and the Digastric and Stylohyoid muscles. These subdivide the triangle into three subordinate triangles, the Digastric or Submaxillary, the Carotid and the Muscular or Inferior Carotid. Examine the boundaries of these triangles.

Divide the Sterno-cleido-mastoid close to its insertion into the clavicle and reflect it upwards. Then saw through the clavicle so as to remove its middle third. Examine

Prætracheal layer of the cervical fascia

Sheath of the Carotid artery.

Running downward upon the sheath of the Carotid find a slender nerve, the *Descendens hypoglossi*; follow it downward until it unites with a similar branch lying to the outer side of the sheath, the *Communicans hypoglossi*, with which it forms the *Ansa hypoglossi*. Note the branches from this to the infrahyoid muscles. These are now to be examined.

Sternohyoid

Omohyoid

Sternothyreoid

Thyreohyoid.

Open the carotid sheath, taking care to avoid injuring the ansa, and examine the

Common Carotid artery

External Carotid

Internal Carotid

Internal jugular vein

Vagus nerve.

Follow out the branches of the external carotid so far as they occur within the limits of the demonstration.

Superior thyreoid; note the internal branch of the superior laryngeal nerve emerging from under the carotid artery and accompanying the laryngeal branch of the artery.

Running downward with the main branch of the artery the external branch of the same nerve may be seen.

Ascending pharyngeal

Lingual

External maxillary (Facial)

Sterno-cleido-mastoid.

Occipital; note curving around this artery (or the preceding) at its origin the hypoglossal nerve. Observe the origin of the descendens hypoglossi and the branch to the thyreohyoid muscle given off from the lower surface of the nerve as it approaches the hyoid bone.

Posterior auricular.

Beneath the sheath of the carotid find the cervical portion of the sympathetic trunk.

Lateral to the carotid sheath note the Anterior scalene muscle and descending upon it observe the Phrenic nerve.

In the submaxillary region examine the

Mylohyoid muscle

Digastric

Stylohyoid

Hyoglossus

External maxillary (Facial) artery and vein, cervical portion

Submaxillary gland

Returning now to the root of the neck examine the

Subclavian vein.

Search carefully at the junction of the subclavian and jugular veins for the

Thoracic duct on the left side and the right lymphatic duct on the right side

Subclavian artery and its branches

Vertebral artery

Thyreo-cervical trunk (Thyroid axis)

Inferior thyreoid

Superficial cervical

Ascending cervical

Transverse scapular (Suprascapular)

Internal mammary

Costo-cervical trunk (Superior Intercostal)

Transversa colli.

DEMONSTRATION III.

Anterior Pectoral and Axillary Regions

SURFACE EXAMINATION.

Trace the clavicle, subcutaneous along its entire length.

Pass the finger down the median line of the sternum, noting the angle of the sternum, corresponding to the articulation of the second rib, and the xiphoid process.

Note the position of the nipple.

Pressing deeply in the axillary fossa note that the head of the humerus can be felt when the arm is moved.

Outline on the anterior wall of the thorax, according to the descriptions given in your text-book, the heart and its valves, the pleuræ and the lungs and their lobes.

ANTERIOR PECTORAL REGION.

Abduct the arm to a position at right angles to the trunk. Make an incision through the skin over the median line of the sternum from the upper border of the manubrium to the xiphoid process, and from the lower end of this carry another incision obliquely upwards and laterally along the anterior axillary fold

to the arm. Reflect laterally the flap of skin thus outlined, taking care to separate the skin from the superficial fascia immediately below it.

If the subject be a female make a circular incision through the skin at the margin of the areolar area of the mammary gland, so as to leave this and the nipple attached to the body of the gland.

Examine the superficial fascia.

Cut through the superficial fascia along the median line of the sternum and with the handle of your scalpel or a probe dissect up the fascia laterally, finding and preserving the cutaneous vessels and nerves that pass into it from below.

Examine the mammary gland.

Examine the deep pectoral fascia.

Pectoralis major—Note the upper portion of the Cephalic vein lying in the groove between the pectoralis major and deltoid muscles.

Carefully dissect away the skin and superficial fascia from over the base of the axillary fossa so as to expose the

Axillary fascia—Note that it extends between the lower borders of the pectoralis major and latissimus dorsi muscle. Observe the Axillary arch.

Divide the pectoralis major close to its sternocostal and clavicular origins and reflect it upwards and laterally, being careful to avoid cutting the nerves and vessels that enter the upper part of its under surface. Examine

Coraco-clavicular fascia (Costo-coracoid membrane).

Trace it laterally to the coracoid process and note that it encloses in its upper part the Subclavius muscle.

Perforating the fascia observe

Thoraco-acromial (Acromio-thoracic) artery and vein, dividing into their acromial, deltoid (humeral) and pectoral branches.

Lateral anterior thoracic nerve.

Upper portion of the Cephalic vein.

Examine the Pectoralis minor and the Subclavius muscles.

THE STERNO-CLAVICULAR ARTICULATION.

Examine the Articular capsule ,

Sterno-clavicular ligaments

Inter-clavicular ligaments

Costo-clavicular (Rhomboid) ligament.

Open the joint cavity by cutting through the anterior wall of the articular capsule and observe the

Articular disk

Synovial cavities.

Study in detail the form and markings of the Clavicle.

THE AXILLARY FOSSA.

Identify the structures forming its walls. Anteriorly the pectoralis major, pectoralis minor and the coraco-clavicular fascia; posteriorly the subscapularis, teres major and latissimus dorsi; medially the upper digitations of the serratus anterior (magnus).

Cut through the pectoralis minor about four centimetres from its attachment to the coracoid process and reflect it medially, taking care not to injure the medial anterior thoracic nerve entering its under surface. Remove the coraco-clavicular fascia. The axillary fossa is now exposed throughout its entire extent, from in front. Carefully dissect away the areolar tissue and fat contained in the fossa and clean the various vessels and nerves. Examine the ,

Axillary lymphatic nodes

Intercosto-brachial (Intercosto-humeral) nerve

Axillary artery and vein—Note their relations and find their branches.

Superior thoracic

Thoraco-acromial (Acromio-thoracic)

Lateral (Long) thoracic

Subscapular

Anterior humeral circumflex

Posterior humeral circumflex.

THE BRACHIAL PLEXUS.

Supra-clavicular portion. Examine its structure and identify the following branches

Dorsal scapular

Long thoracic

Anterior thoracic

Subclavian

Suprascapular

Subscapular

Thoraco-dorsal (Long subscapular).

Infraclavicular portion. Note the formation of the three cords, lateral, medial and posterior, their relations to the axillary artery and their division into nerves.

Lateral cord

Musculo-cutaneous

Lateral head of the median

Median cord

Medial head of median

Ulnar

Medial antibrachial (Internal) cutaneous

Medial brachial (Lesser internal) cutaneous

Posterior cord

Axillary (Circumflex)

Radial (Musculospiral).

Examine the Serratus anterior (magnus).

DEMONSTRATION IV.

The Thorax and Thoracic Viscera

Examine on the skeleton the boundaries of the superior and inferior apertures of the thorax.

In the upper aperture of the thorax note the dome of the pleura and the relation to it of the Scalene muscles, the subclavian artery and the costo-pleuro-vertebral ligament or the Scalenus minimus if it is present.

THE THORAX.

Clean and examine the

External intercostal muscles

External intercostal ligaments (Anterior intercostal membranes).

Divide several of the external intercostal muscles and liga-

ments along their lower borders and reflect them upwards, exposing the

Internal intercostal muscles.

Draw downwards gently the lateral cutaneous nerve of one of the dissected intercostal spaces. This will bring into view the

Intercostal nerve.

Trace this medially, carefully dissecting away the fibres of the internal intercostal muscle so as to expose it, and note its termination in an anterior cutaneous branch

In another intercostal space trace medially an

Intercostal artery.

Note that two intercostal arteries occur, one along the upper and the other along the lower border of the space. Observe that before reaching the sternum each terminates in a longitudinal vessel, the

Internal mammary artery.

Expose this throughout its entire length by carefully removing the portions of the intercostal muscles covering it in each intercostal space and, if necessary, cutting away the sixth costal cartilage to observe its terminal bifurcation. Note the slips of muscle upon which the artery rests, the

Transversus thoracis (*Triangularis sterni*).

THE THORACIC CAVITY.

Cut through the costal cartilages at their junctions with the ribs and carefully dissect away the sternum and costal cartilages, beginning from below. Great care should be taken to separate the internal mammary artery from the ribs and leave it and the parietal pleura intact. You will now have exposed for examination the

Anterior mediastinum.

Study the sternum in detail, noting the spacing and mode of articulation of the costal cartilages.

Examine the parietal layer of the pleura.

Lay open the pleural cavity by an incision through the parietal pleura on a line with the junctions of the costal cartilages and ribs and enlarge the opening by horizontal incisions extending medially. You will now have exposed the

Visceral layer of the pleura—Note its reflection into the

parietal pleura at the root of the lung and along the ligamentum latum pulmonis.

Examine the surface form of the lung, its relations to the pleura and to the thoracic walls.

Clean away the pleura from the root of the lung and examine the structures forming the root, being careful not to injure the phrenic nerve and, on the right side, the vena azygos which curves over the root. The structures at the root are the

Posterior pulmonary plexus. Find the vagus nerve and trace it down to the plexus

Bronchial arteries

Pulmonary veins

Pulmonary artery

Bronchial lymphatic nodes.

Cut through the structures of the root of the lung and remove the lung. Examine more carefully its form, lobes, etc., and study its structure, following into its substance the vessels and bronchus. Study the account of the development of the lung in your text-book of Embryology.

Trace the course of the

Phrenic nerve.

Find the left superior cardiac nerve from the superior cervical sympathetic ganglion and the left cardiac branch of the vagus as they pass over the aortic arch lateral to the left phrenic nerve. Follow them downward to the

Superficial cardiac plexus.

Examine the

Middle mediastinum

Thymus gland.

Parietal layer of the pericardium.

Clean away the remains of the thymus gland and examine the following veins and their tributaries

Superior vena cava

Left and right innominate.

Study the account of the development of these structures in your text-book on Embryology.

Open the pericardial cavity by making a vertical incision through the pericardium and a second one extending transversely.

Examine the

Visceral layer of the pericardium—Note its reflections into the parietal layer, the sinus transversus and the sinus obliquus.

Examine the external form and relations of the heart and the course of the following vessels

Coronary arteries

Cardiac veins

Coronary sinus.

Divide the pulmonary artery, the pulmonary veins, the superior and inferior venae cavae and the aorta about one centimetre from their openings into the heart; remove the heart. Cut through the wall of the right atrium (auricle) from just in front of the inferior vena cava and thence to the tip of the auricle (auricular appendix). Reflect the flap so formed, clean out the cavity of the atrium and examine its structure.

Open the right ventricle by an incision beginning at the base of the conus arteriosus about one-half centimetre to the right of the anterior longitudinal (interventricular) groove and extending downwards, parallel to the groove, to the diaphragmatic surface of the heart. Then make a second incision starting from the upper end of the first and extending to the right, parallel to the coronary (auriculo-ventricular) groove and about one centimetre below it. In making this second incision care must be taken not to injure the tricuspid valve. Turn down the flap so formed, clean out the cavity of the ventricle and examine its structure and the tricuspid valves. Slit open the attached portion of the pulmonary artery, passing between the anterior and right semi-lunar valves, and examine these valves.

Open the left atrium (auricle) by an incision extending from the middle of its posterior border to the tip of the auricle (auricular appendix). Clean out the cavity and examine its structure.

Open the left ventricle by an incision beginning one centimetre below the coronary (auriculo-ventricular) groove and extending to the apex of the ventricle. Make a second incision beginning one centimetre below the coronary groove and the same distance to the left of the posterior longitudinal (interventricular) groove and extending downward to meet the first incision at the apex.

Reflect the flap thus formed, clean out the cavity and examine its structure and the mitral valves. Slit up the attached portion of the aorta, taking care to pass between two of the valves, and examine the semilunar valves.

Study in your text-book of Embryology the account of the development of the heart.

Examine the Superior mediastinum and its contents

Arch of the Aorta

Innominate artery

Left common carotid

Left subclavian

Ligamentum arteriosum.

Study the account of the development of these vessels.

Trachea—lower portion and the bronchi.

Examine the Posterior mediastinum and its contents

Vagus nerves—thoracic portion

Recurrent (Recurrent laryngeal) nerve

Oesophagus—thoracic portion

Thoracic aorta

Azygos and hemiazygos veins. Study the account of their development in your text-book of Embryology.

Thoracic duct.

Separate the parietal pleura from the sides of the bodies of the vertebrae and from the inner surfaces of the ribs and examine the

Sympathetic trunk—thoracic portion

Splanchnic nerves

Internal intercostal muscles

Internal intercostal ligaments

Intercostal nerves—proximal portions

Intercostal arteries—proximal portions

Intercostal veins—proximal portions.

THE COSTO-VERTEBRAL AND COSTO-TRANSVERSE ARTICULATIONS.

Extending throughout the length of the vertebral column observe the Anterior longitudinal (Common) ligament.

In connection with one of the ribs examine the

Radiate (stellate) costo-vertebral ligament.

Clean away the radiate ligament and observe the

Interarticular ligament

Anterior and posterior costo-transverse ligaments

Costo-transverse foramen

Costo-transverse articular capsule.

On the skeleton or on prepared bones, study the special peculiarities of the first, tenth, eleventh and twelfth thoracic vertebræ and those of the first, second, eleventh and twelfth ribs.

DEMONSTRATION V.

The Back.

The students working on the lower half of the body should now have completed enough of their dissection to allow the body to be divided transversely at the level of the intervertebral disk between the third and fourth lumbar vertebræ. Turn over the upper half of the body and observe the position of the

Spinous processes of the vertebræ

Ligamentum nuchæ

Scapula.

Make an incision through the skin from the external occipital protuberance downwards along the median line of the back. From the upper extremity of this incision make a second extending transversely laterally to the tip of the mastoid process. Reflect the skin laterally, taking care to leave the superficial fascia intact.

Note the density of the superficial fascia over the back of the neck and its intimate connection with the skin.

Cut through the superficial fascia in the median line and with the handle of your scalpel or a probe raise it laterally, finding and dissecting out the

Dorsal cutaneous branches of the spinal nerves

Dorsal cutaneous branches of the intercostal and lumbar arteries.

Examine the deep fascia of the back

Lumbo-dorsal fascia—posterior layer.

Clean away the deep fascia covering the superficial muscles and note a triangular area between the trapezius, latissimus dorsi and

the vertebral border of the scapula (Triangle of auscultation).
Examine the

Trapezius.

Divide the trapezius close to its origin from the nuchal line, taking care not to divide the great occipital nerve and the occipital artery which perforate the muscle near its line of origin. Then separate the muscle from its attachment to the ligamentum nuchæ and vertebral column and reflect it outwards, observing its supply from the spinal accessory and cervical nerves. Examine the

Latissimus dorsi

Rhomboideus major

Rhomboideus minor

Levator scapulæ

Posterior belly of the omohyoid—its insertion

Transverse scapular (Suprascapular) artery

Suprascapular nerve.

Cut through the Rhomboid muscles close to their origin from the vertebræ and ligamentum nuchæ and reflect them laterally, noting on their under surface the

Dorsal scapular nerve (Nerve to the rhomboids)

Descending (Posterior scapular) branch of the transversæ colli artery.

Cut through the latissimus dorsi close to its origin from the vertebræ and the lumbo-dorsal fascia. Detach it from its attachments to the lower ribs and reflect it laterally, noting entering its ventral surface the

Thoraco-dorsal (Long subscapular) nerve

Examine the Serratus posterior superior

Serratus posterior inferior

Splenius cervicis

Splenius capitis.

Cut through the posterior layer of the lumbo-dorsal fascia by a longitudinal incision close to its attachment to the vertebral column. Dissect it laterally exposing the

Sacrospinalis (Erector spinæ) muscle.

Trace the prolongation of this forward along three lines

Lateral:

Ilio-costalis lumborum

Ilio-costalis dorsi (Accessorius)

Ilio-costalis cervicis (Cervicalis ascendens).

Intermediate:

Longissimus dorsi

Longissimus cervicis (Transversalis cervicis)

Longissimus capitis (Trachelo-mastoid).

Medial:

Spinalis dorsi

Spinalis cervicis

Spinalis capitis.

Divide the splenius capitis and splenius cervicis near their origins and reflect them upwards. So also with the longissimus capitis. You will thus expose the

Occipital artery—the second part of its course

Descending branch (Arteria princeps cervicis)

Semispinalis dorsi

Semispinalis cervicis

Semispinalis capitis (Complexus).

Remove the semispinalis capitis, avoiding injury to the great occipital nerve, which pierces the muscle, and to the descending branch of the occipital artery, passing downwards under cover of the muscle to anastomose with the deep cervical artery. Examine the ligamentum nuchæ and remove its upper portion. You will now have exposed the *Suboccipital triangle*. Clean the muscles forming its boundaries and examine them

Obliquus capitis superior

Obliquus capitis inferior

Rectus capitis posterior major

Rectus capitis posterior minor

Posterior atlanto-occipital membrane

Great occipital nerve

Suboccipital nerve

Vertebral artery.

Study the figures and descriptions given in your text-book of the remaining deep muscles of the back, multifidus, levatores costarum, rotatores, interspinales and intertransversarii. Clean away all the muscles from the spinous processes and arches of the vertebræ and examine the

Supraspinal ligament

Interspinal ligament

Ligamenta flava.

With a saw cut through the vertebral arches on either side, from the third cervical vertebra downward, and remove the dorsal wall of the spinal canal. Examine the

Spinal dura

Spinal arachnoid

Spinal pia

Denticulate ligament

Spinal cord—its general form

Cauda equina

Filum terminale.

With bone forceps cut away the roots (pedicles) of the vertebral arches from the fourth cervical to the second thoracic vertebra inclusive. Examine the roots of the spinal nerves thus exposed and their posterior root ganglia.

Divide the spinal cord transversely above the fourth cervical and again below the first thoracic nerve and cut through the portion thus isolated in the median longitudinal line. Dissect out the nerve roots of each half portion and cut through the middle and posterior scalene muscles and their origins so as to set free the proximal portions of the brachial plexus. Then remove the arm, together with the brachial plexus and the half-portion of the spinal cord, by cutting through the levator scapulæ, the transverse scapular vessels, suprascapular nerve, the long thoracic nerve, the descending branch of the transversa colli artery and the subclavian artery and vein as they pass over the first rib. Label the arm and place it in the storage box for future study.

DEMONSTRATION VI.

The Cranial Region

Shave the head and with the help of a skull identify the following landmarks: Glabella, Inion, Lambda, Bregma, Pterion, Frontal eminence, Parietal eminence, Supraorbital arch, Supra-orbital notch.

Make an incision through the skin extending over the vault of

the cranium from the glabella to the inion, and a second one starting from the middle of the first, downwards over the side of the cranium to the tip of the mastoid process. Carefully reflect the four flaps of skin thus outlined, being particular to leave intact the closely adherent superficial fascia and to avoid injuring the vessels and nerves it contains. Trace these out.

In the frontal region:

- Frontal artery
- Supraorbital artery
- Angular vein
- Supraorbital nerve
- Supratrochlear nerve.

In the temporal region:

- Superficial temporal artery and its branches
- Auriculo-temporal nerve
- Temporal branches of the facial nerve.

In the mastoid and occipital regions

- Posterior auricular artery
- Posterior auricular branch of the facial nerve
- Posterior branch of the great auricular nerve
- Lesser occipital nerve
- Occipital artery
- Greater occipital nerve.

Clean away bit by bit the superficial fascia, leaving these vessels and nerves in place. You will thus expose the

- Epicranial (Occipito-frontalis) muscle

- Epicranial aponeurosis

- Frontalis muscle

- Occipitalis muscle

- Temporal fascia

- Anterior auricular (Attrahens auris) muscle

- Superior auricular (Attollens auris) muscle

- Posterior auricular (Retrahens auris) muscle.

Make an incision three or four centimetres long through the epicranial aponeurosis in the middle line and a second short incision at right angles to this. Lift up the corners of the flaps and observe the loose areolar tissue uniting the aponeurosis to the periosteum.

DEMONSTRATION VII.

The Face.

Shave the hair from the face and eyebrows, and examine the orbital region, noting the

Eyelids

Meibomian glands

Superior and inferior fornix conjunctivae

Lacus lacrimalis

Caruncula lacrimalis

Plica semilunaris

Puncta lacrimalia.

Examine the form of the external ear or auricle (pinna).

Make an incision through the skin along the median line of the face as far as the margin of the upper lip, then prolong it laterally to the angle of the mouth, thence medially along the border of the lower lip to the median line and thence to the chin. Reflect the skin laterally, taking care not to injure the underlying structures. When, in the reflection, the medial palpebral commissure is reached, cut through the skin along the margins of the eyelids, removing the skin from the surface of each lid. Clean and examine the following superficial muscles of the face:

Orbicularis oculi

Zygomaticus

Quadratus labii superioris

 Zygomatic head (Zygomaticus minor)

 Infraorbital head (Levator labii superioris)

 Angular head (Levator labii superioris alæque nasi)

Caninus (Levator anguli oris)

Risorius

Triangularis oris (Depressor anguli oris)

Quadratus labii inferioris (Depressor labii inferioris)

Mentalis

Orbicularis oris

Facial portion of the platysma.

Study the descriptions and figures in your text-book of the muscles of the nose and read the account of the development of the facial muscles in your text-book of Embryology.

Clean and examine the following

Parotideo-masseteric fascia

Parotid duct

Parotid gland.

Pick away portions of the parotid gland to find and then follow out the facial branches of the

Facial nerve

External carotid artery—terminal portion

Superficial temporal

Transverse facial

Internal maxillary—origin

Superficial temporal vein

Posterior facial (Temporo-maxillary) vein.

Trace the course of the

Anterior facial (Facial) vein

External maxillary (Facial) artery.

Examine the

Buccal fat pad

Buccinator muscle.

Find the following nerves

Infratrochlear

Zygomatico-temporal

Zygomatico-facial (Malar)

Infraorbital—terminal branches

Mental.

Separate the orbicularis oculi and reflect it medially.

Examine the

Corrugator (supercilii) muscle

Superior and inferior tarsus

Lateral palpebral raphe (External tarsal ligament)

Medial palpebral ligament (Internal tarsal ligament)

Pars palpebralis of orbicularis oculi (Tensor tarsi).

Reflect medially the medial palpebral ligament and the pars palpebralis of the orbicularis and examine the

Saccus lacrimalis.

Examine the cartilages of the nose.

DEMONSTRATION VIII.

Temporo- and Pterygo-maxillary Regions.

Re-examine the temporal fascia and the structures on its surface, *i.e.*, superficial temporal artery and its branches, auriculo-temporal nerve, temporal branch of the facial nerve, zygomatico-temporal nerve.

Clean and examine the
Masseter muscle.

Cut through the temporal fascia just above its attachment to the zygoma and reflect it upward. Divide the zygoma both medially and lateral to the origin of the masseter and turn the muscle downward, observing the masseteric nerve and artery as they pass to the deeper surface of the muscle, coming through the mandibular (sigmoid) notch. Examine the

Temporal muscle.

Saw through the base of the coronoid process of the mandible and reflect it and the attached temporal muscle upward. Examine the

Deep temporal arteries and nerve.

Saw through the neck of the condyloid process of the mandible and also transversely through the ramus just above the level of the mandibular (inferior dental) foramen. Remove the portion of the ramus between the two cuts and carefully dissect away the remains of the buccal fat pad. Find and examine the

Internal maxillary artery

Pterygoid plexus of veins

External pterygoid muscle

Internal pterygoid muscle

Bucco-pharyngeal fascia

Buccinator (Long buccal) nerve

Buccinator muscle.

Clean and examine the branches of the internal maxillary artery and the mandibular division of the trigeminal nerve, cutting when necessary the external pterygoid muscle.

Arteries:

Deep auricular

Anterior tympanic

Inferior alveolar (Inferior dental)

Middle meningeal

Muscular branches to masseter, temporal, pterygoids and buccinator.

Nerves:

Buccinator (Long buccal)

Masseteric

Deep temporal

Pterygoid

Auriculo-temporal

Lingual—with the Chorda tympani

Inferior alveolar (Inferior dental)

Mylohyoid.

THE TEMPORO-MANDIBULAR ARTICULATION.

Clean away the remains of the external pterygoid from the condyle of the mandible and examine the

Articular capsule

Temporo-mandibular (External lateral) ligament

Spheno-mandibular (Internal lateral) ligament

Stylo-mandibular ligament.

Open the capsular ligament on its lateral surface and examine the Articular disk.

Study the mandible in detail.

DEMONSTRATION IX.

The Submaxillary Region.

Re-examine the structures of the digastric triangle, viz., the Submaxillary gland, the mylohyoid, digastric and stylohyoid muscles and the external maxillary artery and anterior facial vein where they cross the mandible. Free the artery and vein from the submaxillary gland and reflect them downward; reflect the submaxillary gland upward; and divide the mylohyoid and anterior belly of the digastric close to their attachments to the mandible and reflect them downward. Saw through the mandible about half a centimetre lateral to the symphysis and bend it

upward; do not detach it. Examine the following structures:

- Hyoglossus muscle
- Styloglossus
- Geniohyoid
- Hypoglossal nerve
- Submaxillary (Wharton's) duct
- Lingual nerve
- Submaxillary ganglion
- Sublingual gland.

Detach the hyoglossus muscle from the hyoid bone and turn it upward. Examine the

- Lingual artery and veins
 - Suprahyoid branch
 - Dorsal lingual
 - Sublingual
 - Deep lingual (Ranine)

- Genioglossus muscle
- Stylohyoid ligament.

You will now be able to examine more thoroughly the

- Occipital artery
- Posterior auricular artery.

Passing downward behind the external carotid artery observe the

- Stylopharyngeus muscle.

In cleaning this be careful to avoid injuring the

- Glossopharyngeal nerve
- Pharyngeal branch of the vagus.

Note that these last three structures and the styloid process intervene between the external and internal carotid arteries. Examine the

- Internal carotid artery—cervical portion
- Internal jugular vein
- Ascending pharyngeal artery
- Vagus nerve—upper portion
- Spinal accessory nerve—upper portion
- Hypoglossal nerve—upper portion
- Superior cervical ganglion of the sympathetic trunk
- Superior cardiac nerve.

Follow the sympathetic trunk downward in the neck and observe the middle and inferior cervical ganglia.

Behind the upper portion of the internal jugular vein observe the Rectus capitis lateralis muscle.

DEMONSTRATION X.

The Cerebral Meninges, Base of the Skull and Orbit.

Extend the incision that has been made through the epicranial aponeurosis in the median line and reflect the aponeurosis downwards. When, in the reflection, you reach the temporal line, separate the upper border of the temporal fascia from it and the fibres of the temporal muscle from the temporal fossa, and reflect these downward also.

Saw through the outer table of the skull horizontally on either side from the glabella in front to a point a short distance above the inion behind. Then with a chisel and hammer break through the inner table of the bone and remove the skull cap. Examine the

Dura mater

Branches of the Middle meningeal artery

Arachnoidal granulations (Pacchionian bodies)

Superior sagittal (longitudinal) sinus.

Open the superior sagittal sinus throughout its entire length.

Make an incision through the dura mater on each side of the superior sagittal sinus and from the middle of each incision make a cut extending transversely outward to the cut edge of the skull. Reflect outwards the flaps of the dura and examine the

Arachnoid.

Cut through the superficial cerebral veins that pass into the superior sagittal sinus and gently drawing the cerebral hemispheres laterally, examine the

Falx cerebri.

Cut through the falx at its attachment to the crista galli of the ethmoid and draw it backward. Gently raise the frontal lobes of the brain and separate the Olfactory bulbs from the surface of the cribriform plates. Then carefully tilting the brain backward cut through in succession the (1) *Optic nerves* where they enter the skull through the optic foramina; (2) the *Internal carotid arteries*

and the *Infundibulum* between them; (3) the *Oculomotor nerves*, behind and lateral to the carotid arteries. (Note—These and the succeeding nerves should be cut close to the brain on the right side and close to the dura on the left); (4) the *Trochlear nerves*, behind and lateral to the oculomotor and passing forward beneath the border of the tentorium cerebelli.

Now tilt the brain gently to the left so as to expose the surface of the *Tentorium cerebelli*, and cut through this along its attachment to the superior border of the pyramid (petrous portion) of the right temporal bone. Similarly tilting the brain to the right separate the tentorium from its attachment to the left pyramid. Then cut in succession the following nerves: (1) the *Trigeminal*, just in front of the apices of the pyramids; (2) the *Abducens*, perforating the dura over the clivus between the apices of the pyramids; (3) the *Facial*, *Intermediate* and *Acoustic*, (Auditory), entering the internal auditory foramen; (4) the *Glossopharyngeal*, *Vagus* and *Spinal Accessory*, entering the jugular foramen; (5) the *Hypoglossal*, entering the Hypoglossal (Anterior condyloid) foramen.

Now with a scalpel thrust into the vertebral canal cut the vertebral artery and the roots of the first cervical nerve on either side and then divide the spinal cord. The brain may now be removed from the skull and placed in the skull cap. Examine the arteries at the base of the brain:

Vertebral arteries

Anterior spinal

Basilar

Anterior inferior cerebellar

Internal auditory

Branches to the pons

Superior cerebellar

Posterior cerebral

Posterior communicating

Internal carotid

Chorioid

Anterior cerebral

Anterior communicating

Middle cerebral

Circulus arteriosus (Circle of Willis).

Deliver the brain to your Instructor for preservation for future study. Examine the dura mater and observe the

Inferior sagittal sinus in lower border of the falx cerebri

Straight sinus at the junction of the falx and the tentorium

and connecting the superior and inferior sagittal sinuses

Great cerebral vein

Basilar plexus

Occipital sinuses

Transverse (Lateral) sinus. Open these throughout their entire extent and note opening into them the

Mastoid vein

Cavernous sinuses

Intercavernous sinus

Spheno-parietal sinus

Superior petrosal sinus

Inferior petrosal sinus.

Make a diagram showing the course of the blood through the various sinuses to the jugular vein.

Study the Emissary veins: Ophthalmic, parietal, mastoid, condyloid, occipital, pterygoid and note their significance.

Examine the points of exit of the various cranial nerves and also the distribution of the

Anterior meningeal artery

Middle meningeal artery

Meningeal branches of the occipital and vertebral arteries.

Dissect off the dura covering the orbital plates of the frontal bone and the lesser wings of the sphenoid. Make an incision through the dura extending from the tip of the anterior clinoid process to the point where the oculomotor nerve perforates the membrane. This will open the cavernous sinus and care must be taken not to injure the contents of the sinus. Now reflect the dura laterally, extending the line of the incision laterally so as to expose the subdural portions of the oculomotor, trochlear and trigeminal nerves, and thence further laterally along the line of the superior petrosal sinus. Expose also the subdural portion of the abducens nerve. Immediately behind the point of entrance (foramen spinosum) of the middle meningeal artery look for the

Great superficial petrosal nerve

Lesser superficial petrosal nerve.

Examine the Semilunar (Gasserian) ganglion

Mandibular nerve

Maxillary nerve

Ophthalmic nerve.

Note that the semilunar ganglion is contained within a cavity, the *cavum Meckelii*, formed by a splitting of the dura. Raise the ganglion from its bed and look for the

Motor root of the trigeminus.

Examine the course through the cavernous sinus of the

Trochlear nerve

Oculomotor nerve

Ophthalmic nerve

Abducens nerve

Internal carotid artery

Carotid sympathetic plexus.

Cut through the diaphragma sellæ and remove and examine the

Hypophysis cerebri (Pituitary body).

Review osteology of base of skull, cranial surface.

THE ORBIT.

Saw through the vertical portion of the frontal bone near the medial extremity of the supraorbital ridge, being careful to make the cut pass laterally to the pulley for the superior oblique muscle of the eye. Make a second cut at the outer extremity of the ridge and then by a sharp blow of a hammer break through the orbital plate of the frontal bone. Remove the fragments from the underlying periosteum and with a pair of bone forceps remove the rest of the roof of the orbit, cutting away the roof of the optic foramen and that of the superior orbital (Sphenoidal) fissure. Bend forward the portion of the frontal included between the two saw-cuts, which may be done by a sharp blow of the hammer on its cranial surface, and examine the periosteum of the orbit. Note its continuity with the dura at the superior orbital fissure.

Dissect away the periosteum and note immediately below it the

Frontal nerve

Supraorbital

Supratrochlear.

At the back part of the orbit find and trace forward the
Trochlear nerve

Lacrimal nerve accompanied by the lacrimal artery.

Anteriorly and laterally observe the

Lacrimal gland.

Beneath the frontal nerve note and examine the

Levator palpebræ superioris.

Divide the frontal nerve in the middle of its course, turning it forward and backward, and similarly with the levator palpebræ superioris. On raising the posterior portion of the latter a small branch of the Oculomotor nerve will be seen entering its lower surface. Examine the

Superior rectus

Superior oblique.

Divide the superior rectus in the middle of its length and reflect it forward and backward. On raising the posterior portion the superior branch of the oculomotor nerve will be seen entering its lower surface. By carefully removing some of the orbital fat the optic nerve will now be seen; crossing over its proximal portion find the

Naso-ciliary (Nasal) nerve.

Surrounding the distal portion of the optic nerve the Short Ciliary nerves may be found. Trace one of these backward and near the back part of the orbit will be found the

Ciliary ganglion.

Crossing over the proximal portion of the optic nerve there will also be found the

Superior Ophthalmic vein

Ophthalmic artery

Lacrimal artery

Arteria centralis retinae

Ciliary arteries

Supraorbital

Anterior and Posterior Ethmoidal

Frontal

Dorsal nasal

Medial palpebral.

Examine now the

External rectus. Entering its medial surface the abdu-
cens nerve will be seen.

Internal rectus

Inferior branch of the oculomotor nerve

Inferior rectus

Inferior ophthalmic vein.

Pick up with your forceps the fascia covering the eyeball in the interval between the tendons of the superior and external recti and cut through it. You will open into the Interfascial space (Tenon's space), the fascia that has been cut being the Fascia bulbi (Tenon's capsule). Examine the extent of the space and its relations to the tendons of the eye muscles.

Evert the lower eyelid and cut through the inferior conjunctival fornix. Note a small muscle passing outwards and backwards beneath the eyeball, the

Inferior oblique.

Review osteology of orbit.

DEMONSTRATION XI.

The Cervical Prævertebral Region; Pharynx and Larynx.

Divide the trachea and œsophagus transversely about three cm. below the cricoid cartilage. Divide also the common carotid arteries, jugular veins and vagus nerves at the same level. It will be necessary to divide also the inferior thyroid vessels and the recurrent nerve. Draw forward the larynx and œsophagus and separate them and the other structures mentioned from the front of the vertebral column.

Saw through the skull along the posterior border of the pyramid (petrous portion of the temporal) on either side, passing posterior to the jugular foramen, and with a chisel cut through the basilar process of the occipital so as to join the ends of the two saw cuts. Now remove the anterior portion of the skull with the attached soft parts and wrap them up in a moist cloth for study later on.

Study the prævertebral layer of the cervical fascia. Clean it away and examine the

Longus colli muscle.

Longus capitis (Rectus capitis anticus major)

Rectus capitis anterior (minor).

Dissect away the muscles still attached to the transverse processes of the cervical vertebræ and with bone forceps cut away the anterior tubercles and costal processes of the third to the sixth vertebræ, exposing the

Vertebral artery.

Clean away the prævertebral muscles and examine the

Anterior longitudinal ligament of the vertebral column

Anterior atlanto-axial ligament

Anterior atlanto-occipital ligament.

At the back examine the

Posterior atlanto-axial ligament

Posterior atlanto-occipital ligament.

Before proceeding to study the ligaments of the first and second cervical vertebræ, known as the atlas and axis, study the form of these bones on prepared examples.

In the *ATLAS* note its ring like form, there being no true body. Anteriorly it is formed of the *anterior arch*, on the posterior surface of which is an articular facet for articulation with the odontoid process of the axis. Posteriorly is the *posterior arch*, provided in the middle line with a small *tubercle*, which represents the spinous process. The two arches are united on either side by the *lateral masses*, each of which bears on its upper surface an oval concave articular surface for the occipital condyles, and on its lower surface an almost circular flat surface for articulation with the axis. Laterally each lateral mass is prolonged into a short *transverse process*, which as in the other cervical vertebræ is formed of a costal portion and a true transverse process, a foramen between the two transmitting the vertebral artery. Note the *groove for the vertebral artery* on the upper surface of the posterior arch immediately posterior to the surface for the occipital condyle. On the medial surface of the lateral mass note the tubercle for the attachment of the transverse ligament.

The Axis resembles a typical cervical vertebra much more than does the atlas, but is characterized by the body being pro-

longed upwards to form a stout *odontoid process (dens)*, which is really the body of the atlas fused with the body of the axis. At the summit of the process are two roughened surfaces which give attachment to the lateral occipito-odontoid (alar or check) ligaments. On both the anterior and posterior surface of the process there is a smooth surface, that on the anterior surface being for articulation with the anterior arch of the atlas, while the posterior one is for the transverse ligament of the atlas. The superior articular facets for the lateral masses of the atlas are large and almost circular and are borne partly on the pedicle and partly on the body.

Cut away with bone forceps the arch of the axis and the posterior arch of the atlas. Saw through the occipital bone on either side so as to reach the foramen magnum posterior to the condyles and remove the piece of bone so separated. Examine the

Membrana tectoria (Posterior occipito-axial ligament)

Atlanto-axial capsular ligament

Occipito-atlantoid capsular ligament.

Detach the posterior occipito-axial ligament from the axis and reflect it upwards. Examine the

Cruciate ligament.

Cut through the superior vertical fasciculus of the cruciate ligament and examine the

Ligamentum apicis dentis (Suspensory ligament)

Alar (Check) ligaments.

THE PHARYNX.

Place the anterior portion of the skull on a block so that the dorsal surface of the pharynx is toward you and examine the

Buccopharyngeal fascia

Pterygomandibular raphe.

Carefully dissect away the buccopharyngeal fascia from below and examine the

Inferior constrictor of the pharynx

Middle constrictor of the pharynx.

Between the lower portion of the latter and the upper border of the former observe perforating the hyothyroid membrane the

Inferior laryngeal artery

Internal branch of the superior laryngeal nerve.

Divide the internal pterygoid muscle about its middle and reflect the ends upwards and downwards, being careful to avoid injuring the tensor veli palatini which lies immediately below the upper end. Examine the

Superior constrictor of the pharynx.

Between the lower portion of this and the upper border of the middle constrictor observe the

Stylopharyngeus muscle

Glossopharyngeal nerve.

Between the upper border of the superior constrictor and the base of the skull observe a crescentic area (the sinus of Morgagni) covered in by an upward extension of the buccopharyngeal fascia. Beneath this will be seen the

Levator veli palatini

Tensor veli palatini

Tuba auditiva (Eustachian tube), cartilaginous portion.

Study in your text-book the blood and nerve supply of the pharynx.

Open the pharynx from behind by a vertical incision extending throughout its entire length. Note opening into the cavity the

Larynx

On either side of this the piriform recess and in the anterior part of the recess the fold of the laryngeal nerve

Mouth opening

Velum palatinum (Soft palate) and uvula, bounding it above

Palatine arches (Pillars of the fauces) bounding it laterally and between these the

Palatine tonsil

Choanæ (Posterior nares) with the posterior part of nasal septum.

On the lateral wall of the pharynx immediately behind the choanæ the

Pharyngeal orifice of the tuba auditiva (Eustachian tube).

Pass a probe into this to determine the direction of the tuba and observe, forming its superior and dorsal boundaries, the

Torus tubarius and behind this the
Pharyngeal bursa, frequently indistinct.

Follow the levator and tensor veli palatini into the velum palatinum, cutting away so much of the superior constrictor of the pharynx as may be necessary.

Read in your text-book the account of the blood and nerve supply of the velum palatinum and palatine tonsil.

THE LARYNX.

Dissect away the remaining portions of the infrahyoid muscles and examine the

Thyroid gland
Lobes
Isthmus
Pyramidal lobe.

Note its rich blood supply from the superior and inferior thyroid arteries and the thyroidea ima, sometimes present. Remove the gland, avoiding injury of the inferior thyroid artery, and examine the posterior surface of the lobes to see if you can find any *parathyroid glands*.

Examine the

Trachea
Tracheal cartilages.

Turning the preparation over examine the superior opening of the trachea, and note its anterior boundary, the

Epiglottis. Note its relations to the tongue.

Median and lateral glosso-epiglottic folds.

Extending back on either side from the epiglottis observe the

Ary-epiglottic fold
Cuneiform cartilage
Corniculate tubercle.

At the sides of the larynx note again the

Piriform recess.

Looking down into the cavity of the larynx observe the

Ventricular folds (False vocal cords)

Vocal folds (True vocal cords), and between these the

Rima glottidis.

Turning again to the front of the larynx, dissect away the

inferior constrictor of the pharynx from its attachment to the thyreoid cartilage and observe the

Hyothyreoid membrane

Middle hyothyreoid ligament

Lateral hyothyreoid ligament

Cartilago tritacea, not always present.

Note that the membrane is pierced by the superior laryngeal vessels and nerve.

Thyreoid cartilage

Crico-thyreoid muscle

Crico-thyreoid ligament.

Trace the inferior laryngeal nerve upwards as it lies in the angle between the œsophagus and trachea, and also the inferior laryngeal artery. Dissect away the pharynx from the back of the larynx, avoiding injury to the nerve and artery and observe the

Posterior crico-arytenoid muscle

Arytenoideus.

Dissect away the right crico-thyreoid muscle, divide the right lateral hyothyreoid ligament near its attachment to the superior cornu of the thyreoid cartilage, detach the right inferior cornu of the thyreoid from its union with the cricoid cartilage. Then divide the thyreoid cartilage vertically a little to the right of the median line and carefully remove the portion of its right ala which has been thus detached. This will expose the

Lateral crico-arytenoid muscle

Thyre-arytenoid muscle

Thyre-epiglottic muscle.

Cautiously dissect away the lateral crico-arytenoid and thyreoarytenoid muscles. This will expose the *elastic cone* (Crico-thyreoid membrane), whose upper free border is thickened to form the *vocal ligament* (inferior thyreo-arytenoid ligament), lying between the folds of mucous membrane forming the vocal folds. Note toward the anterior part of this a *sesamoid cartilage*. A similar, but much weaker *ventricular ligament* (superior thyreo-arytenoid ligament) occurs in the interior of the ventricular fold.

Dissect away the remains of the ary-epiglottic fold, the ventricular and vocal folds, leaving the corniculate and arytenoid

cartilages in place. This will expose the left wall of the larynx. Examine this, noting especially between the ventricular and vocal folds the

Ventricle of the larynx.

Clean the cartilages of the larynx and examine especially the

Cricoid cartilage

Arytenoid cartilages

Corniculate cartilages.

Study in your text-book of Embryology the development of the larynx.

DEMONSTRATION XII.

The Tongue and the Pterygo-palatine and Nasal Fossæ.

Remove the portion of the mandible already partly detached, cutting through the inferior alveolar (dental) nerve and artery as they enter the mandibular (dental) canal. Cut through the buccinator muscle backward from the angle of the mouth until you expose the anterior palatine arch (anterior pillar of the fauces). Re-examine the palatine arches and the palatine tonsil, noting the supratonsillar fossa. Dissect the mucous membrane from the palatine arches and observe

Glossopalatine (Palatoglossus) muscle

Pharyngo-palatine (Palato-pharyngeus) muscle.

Continue backwards the incision through the buccinator, cutting the pterygo-mandibular raphe and the lateral wall of the pharynx; divide the internal carotid artery and the vessels and nerves that still connect the pharynx with the skull. Examine the dorsum of the tongue and observe the

Filiform papillæ

Fungiform papillæ

Vallate papillæ

Foramen caecum

Lingual tonsil.

On the under surface note the

Frenulum

Plica fimbriata.

Make a section across the anterior free portion of the tongue and observe the

Superior longitudinal muscle

Inferior longitudinal muscle

Vertical muscle

Transverse muscle

Septum

Anterior lingual gland (Gland of Nuhn).

Review the vascular and nerve supply of the tongue. Study in your text-book of Embryology its development.

Remove whatever remains of the temporal muscle and the upper portion of the internal pterygoid, being careful to preserve the nerve to the latter muscle. Saw through the squamous portion of the temporal and the great wing of the sphenoid, beginning on the cut edge of the skull over the ear and sawing forward and downward to the medial end of the superior orbital (sphenoidal) fissure. The cut should pass just lateral to the foramen rotundum. Make a second cut down along the anterior border of the great wing of the sphenoid to meet the first one at the superior orbital fissure. Remove the wedge of bone included between the two cuts and with bone forceps remove the rest of the great wing of the sphenoid lateral to the foramen rotundum, keeping the margins of the foramen intact. Remove whatever contents still remain in the orbital cavity and cut away the roof of the infraorbital canal. Examine the

Maxillary nerve

Zygomatic nerve

Sphenopalatine nerves.

These traced downwards will lead to the sphenopalatine ganglion, which may, however, be more conveniently studied at a later stage of the dissection

Superior dental nerve

Infraorbital nerve

Infraorbital artery and nerve.

Saw through the skull in a sagittal plane a little to one side of the median line, so as to leave the nasal septum intact, and divide the velum palatinum in the same plane. Remove the mucous membrane from and examine the

Nasal septum

Cartilage of the septum.

Carefully chip away the cartilage and bone of the septum, leaving the mucous membrane on the farther side intact. Observe the

Olfactory nerve

Branches of the ethmoidal arteries

Nasopalatine nerve and artery.

On the other half of the skull examine the lateral wall of the nasal fossa

Superior concha

Agger nasi

Middle concha

Inferior concha.

Above the superior concha and posteriorly observe the

Opening of the sphenoidal sinus.

Reflect the superior concha upward and observe

Openings of the posterior ethmoidal cells

Spheno-ethmoidal recess (if present).

Reflect the middle concha upward and observe the

Infundibulum

Hiatus semilunaris

Bulla ethmoidalis

Opening of the middle ethmoidal cells

Opening of the maxillary sinus (Antrum of Highmore).

Open the maxillary sinus by sawing through the root of the zygomatic process of the maxillary bone. Examine the shape of the cavity and its relations to the roots of the teeth.

Reflect the inferior concha and observe the

Orifice of the nasal duct (lachrymal duct).

Make a vertical incision through the mucous membrane over the internal pterygoid process of the sphenoid and reflect the membrane very carefully forward. Midway between the posterior extremities of the middle and inferior conchæ the lateral superior posterior nasal nerve will be seen passing through a small foramen in the vertical plate of the palate bone, and a little lower the lateral inferior posterior nasal nerve. These nerves come from the palatine nerves in the pterygo-palatine canal,

which may be seen through the bone forming its medial wall. Chip away this wall and follow the nerves upward into the pterygopalatine fossa, where they will be found to take origin from the Spheno-palatine (Meckel's) ganglion.

Review the nerve and blood supply of the nasal cavity and the distribution of the branches of the spheno-palatine ganglion.

Carefully detach the levator veli palatini from its origin and dissect away the cartilaginous portion of the tuba auditiva (Eustachian tube). Find the nerve to the internal pterygoid muscle and follow it upward to the Otic ganglion.

DEMONSTRATION XIII.

The Shoulder and Upper Arm.

Make an incision through the skin extending down the front of the upper arm to about its middle. Reflect the skin laterally, taking care to separate it from the superficial fascia. In this observe the

Cephalic vein—along the anterior border of the deltoid
Lateral brachial cutaneous nerve—winding around the posterior border of the deltoid.

Clean away the superficial fascia, dissecting out the above-named structures, and observe the

Deltoid fascia.

Dissect this off and examine the

Deltoid muscle.

Divide the deltoid close to its origin and turn it downwards. Examine the

Subacromial bursa

Posterior circumflex humeral artery

Anterior circumflex humeral artery

Axillary (Circumflex) nerve.

Trace the posterior circumflex artery and the nerve backward through the quadrilateral space bounded by the humerus laterally, the long head of the triceps medially, the lower border of the

subscapularis above and the upper border of the teres major below. Examine the

Teres major

Lower subscapular nerve

Insertion of the latissimus dorsi

Insertion of the pectoralis major.

Now examine the

Acromio-clavicular articulation

Coraco-clavicular ligament

Conoid ligament

Trapezoid ligament

Coraco-acromial ligament.

Saw through the acromial process where it joins the spine of the scapula. Examine the *supraspinatus* and *infraspinatus fascia* and then dissect them away, exposing the

Supraspinatus muscle

Infraspinatus muscle

Teres minor.

On the costal surface of the scapula examine the *subscapular fascia*. Dissect it away and thus expose the

Subscapular muscle.

Divide the supraspinatus muscle about 3 cm. from its insertion and carefully reflect it backwards. Similarly with the infraspinatus. Examine the

Transverse scapular (Suprascapular) artery and vein

Transverse scapular (Suprascapular) ligament

Suprascapular nerve

Circumflex scapular (Dorsal scapular) artery.

Detach the subscapularis from the scapula and reflect it outwards. Note the *subscapular bursa*. Continue the skin incision down the front of the arm to the bend of the elbow and reflect the skin medially and laterally, leaving behind the superficial fascia. In this observe the

Cephalic vein

Basilic vein

Medial antibrachial cutaneous (Internal cutaneous) nerve, accompanying the basilic vein

Medial brachial cutaneous (Lesser internal cutaneous) nerve

Posterior brachial cutaneous nerve, accompanying the cephalic vein

Intercosto-brachial nerve.

Dissect away the superficial fascia, leaving the veins and nerves intact, and examine the *brachial fascia*. Remove this and examine the

Brachial artery

Profunda brachii (Superior profunda)

Superior ulnar collateral (Inferior profunda)

Inferior ulnar collateral (Anastomotica magna)

Brachial vein

Median nerve

Ulnar nerve

Medial brachial cutaneous nerve

Medial antibrachial cutaneous nerve

Musculo-cutaneous nerve

Biceps

Coracobrachialis

Brachialis

Radial (Musculo-spiral) nerve

Axillary (Circumflex) nerve.

In the superficial fascia of the back of the upper arm observe the

Branches of the medial brachial cutaneous nerve

Lateral brachial cutaneous branches of the axillary nerve

Posterior brachial cutaneous branch of the radial nerve

Dorsal antibrachial cutaneous branch of the radial nerve.

Dissect away this superficial fascia, leaving the nerves in place. Observe the posterior portion of the *brachial fascia*; dissect it away and examine the

Triceps

Divide the lateral head of the triceps over the groove for the radial nerve (musculo-spiral groove) and trace out the

Radial (Musculo-spiral) nerve

Profunda brachii artery

Ulnar nerve

Superior ulnar collateral artery

Posterior branch of inferior ulnar collateral artery.

Divide the biceps and coracobrachialis close to the coracoid process, the teres major about its middle, the long head of the triceps 3 cm. from its origin, and the teres minor about 3 cm. from its insertion. Reflect these muscles very carefully and so expose the

Shoulder joint

Articular capsule

Coraco-humeral ligament

Middle gleno-humeral ligament

Inferior gleno-humeral ligament.

Cut a window in the posterior wall of the articular capsule and, drawing the bones apart, observe the

Superior gleno-humeral ligament

Tendon of the biceps.

Make a circular incision through the articular capsule, divide the tendon of the biceps and remove the scapula. Note the

Glenoid ligament

Synovial membrane

Communication of the cavity with the subscapular bursa

Prolongation in the intertubercular (bicipital) groove around the tendon of the biceps.

Review in detail the osteology of the scapula and its ossification.

DEMONSTRATION XIV.

Forearm and Hand.

Continue the median skin incision down the forearm as far as the hand and reflect the skin laterally and medially, preserving the superficial fascia. In this observe on the volar surface of the forearm the

Cephalic vein

Basilic vein

Median cubital vein

Volar branch of the medial antibrachial cutaneous nerve

Ulnar branch of the medial antibrachial cutaneous nerve

Lateral cutaneous branch of the musculo-cutaneous nerve.

Clean away the superficial fascia of the front of the forearm, leaving the above-named structures in place, and examine the

Antibrachial fascia

Lacertus fibrosus of the biceps muscle.

Dissect away the antibrachial fascia from the front of the forearm, separating from it the lacertus fibrosus of the biceps. Examine the boundaries and contents of the cubital fossa at the bend of the elbow

Lateral boundary—Brachio-radialis

Medial boundary—Pronator teres

Contents—Median nerve

Brachial artery

Ulnar artery

Radial artery

Radial recurrent artery

Radial (Musculo-spiral) nerve

Superficial radial nerve

Deep radial (Posterior interosseus) nerve

Inferior ulnar collateral artery.

To observe these last five structures the brachioradialis must be drawn aside laterally and the pronator teres medially

Floor—Tendon of biceps

Brachialis

Supinator (brevis).

Follow down the forearm to the wrist the

Radial artery

Superficial volar branch

Volar carpal (Anterior carpal) branch.

Note the superficial radial nerve accompanying the artery downwards from about the middle of the forearm. Clean the superficial muscles of the volar surface of the forearm

Pronator teres

Flexor carpi radialis

Palmaris longus

Flexor carpi ulnaris

Transverse carpal (Anterior annular) ligament

Flexor digitorum sublimis.

Divide and reflect the humeral head of the pronator teres and

divide the remaining superficial muscles at about the middle of their length. Reflect them upwards and downwards. Examine the

Ulnar artery

Recurrent ulnar arteries

Common interosseous artery

Carpal branches

Ulnar nerve

Median nerve

Median artery

Flexor digitorum profundus

Flexor pollicis longus.

Cut through the flexor digitorum profundus and flexor pollicis longus at about the middle of their length and examine the

Volar interosseous artery

Volar interosseous branch of the median nerve

Pronator quadratus.

Review in detail the osteology of the Radius and Ulna, and their ossification.

Continue the median skin incision along the palm of the hand to the roots of the fingers and in that region make a transverse incision across the hand. Reflect the skin laterally and medially, being careful in the case of the medial flap not to destroy the *palmaris brevis* which is inserted into it. Make an incision down the median line of each of the digits and reflect the skin from their volar surfaces. Examine the

Superficial fascia

Palmaris brevis

Palmar cutaneous branches of the median and ulnar nerves.

Clean away the superficial fascia and examine the

Palmar aponeurosis

Insertion of the palmaris longus.

Raise the central part of the palmar aponeurosis and divide it in its proximal portion. Reflect it distally and remove it. Examine the

Ulnar artery

Deep branch. Will be studied later

Superficial volar arch

Common volar digital branches

Proper volar (Collateral) digital branches.

Ulnar nerve

- Deep branch. Will be studied later

- Superficial branch

- Proper volar digital branch of the fifth digit

- Common volar digital branch

- Proper volar digital branches to the fourth and fifth digits

Median nerve

- Common volar digital branches

- Proper volar digital branches

- Transverse carpal (Anterior annular) ligament

- Tendons of the long flexor muscles and their sheaths.

Divide the superficial volar arch at each end and turn it distally. Divide the median nerve and reflect it and the flexor digitorum sublimis distally, after cutting through the transverse carpal ligament. Examine the

- Lumbrical muscles.

Reflect the flexor digitorum profundus and the lumbricals distally and examine the

- Abductor pollicis brevis

- Opponens pollicis

- Flexor pollicis brevis

- Adductor pollicis

- Abductor digiti quinti

- Flexor digiti quinti brevis

- Opponens digiti quinti

- Deep volar branch of the ulnar nerve

- Deep volar arch

- Volar metacarpal arteries

- Volar interosseous muscles

- Dorsal interosseous muscles.

Remove the skin from the back of the forearm and hand and find in the superficial fascia the

- Dorsal antibrachial cutaneous branch of the radial nerve

- Terminal portion of the superficial radial nerve

- Dorsal branch of the ulnar nerve

- Origin of the cephalic and basilic veins.

Clean away the antibrachial fascia from the back of the arm,

except near the elbow where muscles take origin from it and at the wrist where it thickens to form the *dorsal carpal* (posterior annular) *ligament*. Clean and examine the superficial muscles of the dorsal surface of the forearm

- Brachioradialis
- Extensor carpi radialis longus
- Extensor carpi radialis brevis
- Extensor digitorum communis
- Extensor quinti digiti proprius
- Anconeus
- Extensor carpi ulnaris.

Divide the extensor digitorum communis and the extensor quinti digiti proprius about the middle of their fleshy bellies and reflect them upwards and downwards. Note the branches from the deep radial nerve entering their deep surfaces. Examine the

- Abductor pollicis longus (Extensor ossis metacarpi pollicis)
- Extensor pollicis brevis (Extensor primi internodii pollicis)
- Extensor pollicis longus (Extensor secundi internodii pollicis)
- Extensor indicis proprius
- Deep radial (Posterior interosseous) nerve
- Posterior interosseous artery

Posterior interosseous recurrent artery.

Review the arterial anastomosis at the elbow.

At the wrist examine the

- Sheaths of the Extensor tendons
- Radial artery
- Dorsal carpal branch
- First dorsal metacarpal branch
 - Ulnar dorsalis pollicis
 - Dorsalis indicis
- Radial dorsalis pollicis
- Dorsal carpal rete
 - Dorsal metacarpal arteries

Anterior interosseous artery—terminal portion.

Examine the arrangement of the extensor tendons on the digits. Read in your text-book of Embryology the account of the development of the arteries of the arm.

DEMONSTRATION XV.

The Elbow Joint, Wrist Joint and Carpal Articulations.

Dissect away the muscles of the forearm, except the *supinator*, which should be cleaned and examined. Remove the supinator and brachialis and divide the biceps and triceps a short distance above their insertions and draw them aside.

Note that the elbow joint consists of three articulations, the *humero-ulnar*, *humero-radial* and *proximal radio-ulnar*. Clean and examine the

Articular capsule

Ulnar collateral (Internal lateral) ligament

Radial collateral (External lateral) ligament

Annular (Orbicular) ligament.

Cut transversely across the front of the articular capsule and examine the extent of the synovial cavity. Note that the cavity is common to all three articulations. Clean and examine the

Interosseous ligament

Chorda obliqua (Ligament of Weitbrecht).

THE WRIST JOINT.

Clean away the muscles of the thenar and hypothenar eminences. Note that the wrist joint consists of two articulations, the *radio-carpal* and the *distal radio-ulnar*. Clean and examine the

Articular capsule

Dorsal radio-carpal ligament

Volar radio-carpal ligament

Ulnar collateral ligament

Radial collateral ligament.

Divide transversely the volar radio-carpal and collateral ligaments and examine the synovial cavity. Note the

Articular disk (Triangular fibro-cartilage).

Note that the cavity of the distal radio-ulnar articulation is usually quite distinct from that of the radio-carpal.

THE CARPAL ARTICULATIONS.

Clean the surface of the carpus and note on the volar surface the *radiate carpal ligament*, consisting of bundles converging to the capitate bone (os magnum). On the distal surface of the wrist joint observe the *interosseous ligaments* extending between the navicular and lunate and the lunate and triquetral bones.

Open the transverse carpal articulation between the two rows of carpal bones, from the dorsal surface. Cut the interosseous ligament between the navicular and capitate bones if it is present. Note the strong interosseous ligament between the capitate and hamate bones.

The synovial cavities of the carpal articulations are two in number, one between the pisiform and triquetral bones and the other between the remaining bones and also extending to the carpo-metacarpal articulation of the second and third digits.

THE CARPO-METACARPAL ARTICULATIONS.

Examine the carpo-metacarpal articulation of the thumb. Note the *articular capsule* thickened on the dorsal and volar surfaces. Note that the joint has an independent synovial cavity.

In the carpo-metacarpal articulations note the *dorsal* and *volar ligaments* and also the *basal interosseous ligaments* extending between the bases of the bones. Divide the volar ligaments and observe the *carpo-metacarpal interosseous ligament* extending from the contiguous borders of the hamate and capitate bones to the contiguous borders of the bases of the third and fourth metacarpals. This divides the synovial space into two cavities, one for the fourth and fifth metacarpals and one for the second and third, this latter cavity being continuous with the general carpal cavity.

THE METACARPO-PHALANGEAL ARTICULATIONS.

Clean away the interosseous muscles and note the

Transverse capitular ligaments of the metacarpals

Volar accessory (palmar) ligaments

Articular capsules

Collateral ligaments.

Note in the articular capsule of the thumb joint two sesamoid cartilages; occasionally others are also present in the joint of the little finger and rarely in that of the first finger.

Note the relations of the extensor tendons to the joints.

THE INTERPHALANGEAL JOINTS.

Examine one of these and observe the

Articular capsule

Collateral ligaments.

DISSECTION OF THE LOWER HALF OF THE BODY.

DEMONSTRATION I.

The Anterior Abdominal Wall.

THE REGIONS OF THE ABDOMEN.

Observe the following by inspection and palpation

Xiphoid process

Costal cartilages

Depression in the median line marking the position of the
linea alba

Umbilicus

Symphysis pubis

Tubercle (Spine) of the pubis

Inguinal (Poupart's) ligament

Spermatic cord in the male

Anterior superior spine of the ilium

Crest of the ilium.

SURFACE MARKINGS.

With a piece of red chalk draw a line transversely across the abdominal wall from the lowest point of the right tenth costal cartilage to the corresponding point on the left side. Draw a second horizontal line from the right superior spine of the ilium to the corresponding point on the left side. Then draw a line along the outer border of the rectus abdominis muscle of each side from the tubercle of the pubis upwards, prolonging it above the upper horizontal line to the level of the xiphoid process. Planes corresponding to these lines will divide the abdomen into nine regions, In the middle line above is a triangular area, bounded laterally by the line of the costal cartilages and known as the *Epigastric Region*; lateral to this on either side, beneath the costal cartilages, are the *Right* and *Left Hypochondriac Regions*. In the interval between the two horizontal planes there is in the median line the

Umbilical Region, and lateral to this on either side the *Right* and *Left Lateral Abdominal (Lumbar) Regions*. Finally in the lower row there is in the median line the *Hypogastric Region* and on either side of this the *Right* and *Left Inguinal Regions*.

Make an incision through the skin from the xiphoid process to the symphysis pubis. From the upper extremity of this carry an incision laterally along the lower border of the costal cartilages, and from its lower extremity make a third incision extending outwards along the line of the inguinal ligament and then along the crest of the ilium to its highest point. Reflect laterally the flap of skin thus outlined, being careful not to include the superficial fascia. Examine the

Superficial fascia

Superficial layer (Fascia of Camper)

Deep layer (Fascia of Scarpa).

Dissect away the superficial fascia, using a probe or the handle of your scalpel extensively, so as to find the cutaneous nerves and vessels that pass through the fascia. Of these note the

Anterior cutaneous branches of the intercostal nerves

Anterior cutaneous branch of the ilio-hypogastric nerve

Cutaneous branch of the ilio-inguinal on the spermatic cord

Lateral cutaneous branches of the intercostal nerves

Superficial epigastric artery and vein

Superficial circumflex iliac artery and vein

External pudendal arteries and veins crossing the spermatic cord

Thoraco-epigastric vein, if present.

After complete removal of the superficial fascia, leaving intact the above-named arteries and nerves, observe the

Deep fascia

Linea alba

Linea semilunaris

Inguinal (Poupart's) ligament

Spermatic cord enclosed in the external spermatic fascia or, if the subject is a female, the

Round ligament of the uterus.

Cut the external spermatic fascia around the cord, or that around the ligament, and observe the

Subcutaneous inguinal (External abdominal) ring.
Clean away the deep fascia so as to expose the
External oblique muscle.

Divide the external oblique close to the line at which it passes into the aponeurosis and also just above the line of its attachment to the crest of the ilium. Reflect the muscle laterally and examine

Internal oblique muscle

Cremaster muscle.

Note piercing the internal oblique near the iliac crest the
Ilio-hypogastric nerve
Ilio-inguinal nerve.

Divide the internal oblique just above its attachment to the crest of the ilium and the outer part of the inguinal ligament; divide it also just lateral to the line at which it passes into its aponeurosis. Reflect the muscle laterally, taking care not to injure the nerves lying beneath it. Observe the

Lower six intercostal nerves—the iliac branch of the lowest
Ilio-hypogastric nerve—its iliac branch

Ilio-inguinal nerve

Lower three intercostal arteries

Lumbar arteries

Transversus abdominis.

Divide the transversus close to the line at which it passes into the aponeurosis and just above its origin from the inguinal ligament and the crest of the ilium. Reflect it laterally and observe the

Transversalis fascia

Deep circumflex iliac artery

Abdominal inguinal (Internal abdominal) ring

Vaginal process of Transversalis fascia (Infundibuliform fascia).

Observe now the contents of the inguinal canal

Spermatic cord—Round ligament of the uterus in the female

Ilio-inguinal nerve

External spermatic nerve (Genital branch of the genito-crural nerve).

Examine the ventral wall of the sheath of the rectus muscle. Make an incision along its median line throughout its entire

length and reflect the halves medially and laterally. Examine the

Rectus abdominis muscle

Tendinous inscriptions

Pyramidalis.

Divide the rectus near its attachment to the pubic bone and reflect it upwards, observing the *inferior (deep) epigastric artery* entering its lower surface. Separate the muscle from its upper attachment and turn it downwards, observing the *superior epigastric artery* entering its lower surface. Cut the two arteries and remove the rectus muscle. Examine the

Sheath of the rectus, dorsal wall

Linea semicircularis (Fold of Douglas).

Note that above the linea semicircularis the sheath is much thicker than it is below.

Cut through the transversalis fascia and peritoneum from the anterior superior spine of the ilium to a point on the linea alba just below the umbilicus. Raise the portion of the fascia and peritoneum below the incision and, examining it from its inner surface, observe

A median fold of peritoneum extending from the apex of the bladder to the umbilicus and containing the urachus

Lateral to this on either side a fold from the side of the bladder to the umbilicus containing the obliterated portion of the hypogastric artery

The concavity between these two folds—the supravescical fossa

More laterally the line of the lateral border of the rectus muscle

Still more laterally a fold of peritoneum containing the inferior (deep) epigastric vessels

Between the border of the rectus and the epigastric vessels, the medial inguinal fossa

Lateral to the epigastric vessels, the lateral inguinal fossa.

Carefully separate the peritoneum from the transversalis fascia, noting the subserous areolar tissue, and locate the position of the abdominal inguinal ring; note the relation to this of the inferior epigastric artery. Note also, if the subject is a male, the ductus (vas) deferens passing upward to the ring and its relation to the inferior epigastric artery.

Observe a thickened band of the fascia transversalis curving around the medial and lower borders of the abdominal ring, the *interfoveolar ligament*.

The triangular area bounded by the inferior epigastric artery laterally, the lateral border of the sheath of the rectus medially and the inguinal ligament below is known as *Hesselbach's triangle*. Note that its floor is formed by a thickening of the transversalis fascia, the *falx aponeurotica* (conjoined tendon), and observe also extending upwards and medially across it fibres from the inguinal ligament, the *reflex ligament* (triangular fascia).

Observe a triangular membrane extending from the medial extremity of the inguinal ligament horizontally inwards to the linea terminalis (iliopectineal line) of the pubis. This is the *lacunar (Gimbernat's) ligament*. Note that its lateral border is free and forms the medial boundary of an opening situated below the inguinal ligament, the *femoral ring*, lateral to which are the external iliac vessels.

DEMONSTRATION II.

The Abdominal Contents and Peritoneum.

Divide the transversalis fascia and peritoneum about 1 cm. lateral to the linea alba, from the xiphoid process to the pubis and reflect the flaps. Observe the

Parietal peritoneum of ventral abdominal wall

Round ligament of the liver, extending from the umbilicus to the liver in a fold of peritoneum, the falciform ligament of the liver—a portion of the ventral mesentery.

Study the abdominal viscera in position

Ventral edge of the liver

Gall bladder

Stomach

Greater omentum

Small intestine—jejunum and ileum

Large intestine

Caecum

Vermiform appendix

Ascending colon

Transverse colon

Descending colon

Sigmoid colon.

Pass your hand upwards and dorsally around the fundus of the stomach and note the position of the

Spleen.

PERITONEUM.

Read over the account of the development of the peritoneum in your text-book of Embryology.

THE VENTRAL MESENTERY.

Trace the falciform ligament of the liver upon the upper surface of that organ. Note the reflection of its layers laterally over the surface of the liver and over its borders to the under surface, where they pass into a frontal sheet extending from the under surface of the liver to the lesser curvature of the stomach. This is the

Lesser (Gastro-hepatic) omentum

Hepato-duodenal ligament

Epiplioic foramen (Foramen of Winslow).

DORSAL MESENTERY.

Greater omentum.

Examine its structure and development. Note that the two ventral layers are attached to the greater curvature of the stomach and the two dorsal ones to the transverse colon. Cut through the two ventral layers just below the stomach and examine the

Bursa omentalis (Lesser sac of the peritoneum)

Superior recess—extending upwards behind the liver

Inferior recess—extending downwards into the greater omentum

Lienal recess—extending to the left as far as the spleen

Gastro-lienal ligament (Gastro-splenic omentum) forming its left wall

Its communication with the general peritoneal cavity by the epiplioic foramen.

Reflect the greater omentum upwards, drawing the transverse colon with it, and examine the

Transverse mesocolon

Phrenico-colic ligament.

Find the terminal portion of the duodenum emerging from under the root of the transverse mesocolon to become continuous with the jejunum. Observe, attaching the jejunum to the dorsal wall of the abdomen, the

Mesentery.

Follow this throughout its entire length, noting the length of its attachment to the dorsal wall of the abdomen and that of its attachment to the jejunum and ileum. At the junction of the jejunum and duodenum note the

Superior duodenal fossa

Inferior duodenal fossa

Duodeno-jejunal fossa (Paraduodenal fossa).

At the junction of the ileum and the ascending colon observe the Mesenteriole of the vermiform appendix

Ileo-caecal fold, between the ileum and the base of the appendix

Superior ileo-caecal fossa

Inferior ileo-caecal fossa, behind the ileo-caecal fold.

Bend upward the caecum and appendix and observe behind the former the

Retrocaecal fossa.

Observe that the ascending and descending colons have, as a rule, no mesentery. Examine the

Sigmoid mesocolon.

The pelvic portion of the peritoneum will be studied later.

At the duodeno-jejunal flexure find the *superior mesenteric artery* at the root of the mesentery. Follow out its branches, dissecting away the layer of peritoneum covering them

Inferior pancreatico-duodenal artery

Intestinal arteries

Ileo-colic artery

Appendicular artery

Right colic artery

Middle colic artery.

Examine the veins corresponding to these arteries and trace the *superior mesenteric vein* upwards until it joins the splenic vein.

Observe also the *mesenteric lymph nodes* and their distribution, and examine the fine plexus of nerves upon the surface of the superior mesenteric artery, the *superior mesenteric plexus*.

Turn the coils of the small intestine to the right and find the *inferior mesenteric artery*. Follow out its branches, dissecting away the layer of peritoneum covering them

Left colic artery

Sigmoid arteries

Superior haemorrhoidal arteries.

Examine the corresponding veins and follow the inferior mesenteric upwards to the root of the transverse mesocolon.

DEMONSTRATION III.

The Intestines, Stomach and Pancreas.

Tie two ligatures around the upper part of the jejunum about 5 cm. from the duodeno-jejunal flexure and divide the jejunum between them. Similarly tie two ligatures around the lower end of the ileum about 10 cm. from the ileo-caecal junction and divide the ileum between them. Cut through the mesentery along the line of its attachment to the intestine and remove the jejunum and ileum. Remove the ligatures from the portion of the intestine that you have taken out and wash its contents. Slit open the intestine lengthwise along the line of the attachment of the mesentery. Observe the

Circular folds (*Valvulae conniventes*)

Villi

Solitary lymphatic nodules

Aggregated lymphatic nodules (Peyer's patches). These may be found by holding the intestine, especially the ileum, up to the light.

Compare the jejunum and lower part of the ileum as to the development of the circular folds, villi and lymphatic nodules.

Examine the large intestine and observe the

Taeniae (Longitudinal muscle bands). Note their relation to the base of the vermiform appendix

Haustra (Sacculations of the large intestine)

Epiplöic appendages.

Tie two ligatures around the large intestine where it crosses the sacro-iliac articulation and divide it transversely between them.

Cut away the greater omentum from its attachment to the transverse colon and remove the large intestine, taking care to cut the layers of the greater omentum that extend up to the stomach close to the upper border of the transverse colon. Remove the ligatures from the intestine and wash out its contents.

Tie a ligature around the ascending colon about 10 cm. above the ileo-caecal junction and cut the colon above the ligature. Inflate the portion of intestine thus separated from the ileum and hang it up to dry. When dry cut away the lateral wall of the caecum and observe the

Ileo-caecal valve

Orifice of the appendix.

Slit up the remaining portion of the large intestine and observe the Semilunar folds.

Note the absence of circular folds and villi.

Raise the anterior edge of the liver and fasten it to the lower border of the thorax; draw down the stomach and cut through the ventral layer of the lesser omentum and hepato-duodenal ligament. Observe in the latter the

Common bile duct—follow it down to its opening into the duodenum

Portal vein—its origin will be examined later

Hepatic artery

Right gastric (Pyloric) artery

Gastro-duodenal artery.

Reflect the stomach upwards and observe the gastro-duodenal artery passing downwards over the head of the pancreas and dividing into the

Superior pancreatico-duodenal artery

Right gastro-epiploic artery.

Replace the stomach and follow the hepatic artery toward the median line, beneath the layer of peritoneum forming the posterior wall of the omental bursa. In this and the succeeding operations care should be taken to avoid injury to the Coeliac plexus. Find the

Coeliac artery

Left gastric (Coronary) artery

Œsophageal branches

Splenic artery.

Again reflect the stomach upwards and follow the course of the splenic artery, finding its branches

- Pancreatic
- Left gastro-epiploic
- Short gastric
- Splenic.

Examine the *gastric vein*.

Study the relations of the stomach and review its blood supply.

Place two ligatures around the first part of the duodenum just below the pylorus and divide between them; place two others around the abdominal portion of the œsophagus and divide between them. Remove the stomach and wash out its contents. Examine the form of the stomach, observing the

- Cardia
- Fundus
- Lesser curvature
- Greater curvature
- Pylorus.

Open it along the greater curvature and examine the

- Mucous membrane.
- Pyloric sphincter

Examine the duodenum and pancreas in place. Note their relations. What is their relation to the root of the transverse mesocolon? Examine the

- Superior pancreatico-duodenal artery
- Inferior pancreatico-duodenal artery.

Dissect out the ducts of the pancreas

- Pancreatic duct
- Accessory pancreatic duct.

Cut through the common bile duct a short distance above its entrance into the wall of the duodenum. Remove the duodenum and pancreas together, taking care not to injure the splenic and portal veins lying behind the pancreas. Slit open the duodenum along its convex border, wash out its contents and observe the

- Circular folds (*Valvulæ conniventes*)
- Villi
- Longitudinal fold
- Papilla.

Pass bristles into the common bile duct and the two pancreatic ducts and observe their entrance into the duodenum. Examine the

Portal vein

Coronary vein of the stomach

Superior mesenteric vein

Inferior mesenteric vein

Splenic vein.

Study in your text-book the account of the anastomoses formed by tributaries of the portal system

Œsophageal anastomoses

Rectal anastomoses

Umbilical anastomoses.

DEMONSTRATION IV.

The Liver, Spleen and Kidneys.

THE LIVER.

Divide the round ligament and separate the falciform ligament from the anterior abdominal wall and lower surface of the diaphragm. Draw the liver downwards and observe the

Coronary ligament—upper layer

Triangular ligament.

Cut through these and note that below the upper layer of the coronary ligament the liver is separated from the diaphragm only by areolar tissue. Divide this by depressing the liver and you will see the inferior vena cava passing through the central tendon of the diaphragm. Divide the vena cava and observe the lower layer of the coronary ligament; cutting through this, divide the vena cava again just below the ligament and divide also the hepatic artery and portal vein. Remove the liver and examine its general form

Right lobe

Left lobe

Caudate lobe

Papillary process (Spigelian lobe)

Caudate process (Caudate lobe)

Quadrangle lobe

Portal fissure

Right sagittal fossa

Fossa for the gall bladder

Fossa for the vena cava

Left sagittal fossa

Fossa for the umbilical vein

Fossa for the ductus venosus

Cardiac impression

Œsophageal impression

Gastric impression

Duodenal impression

Renal impression

Colic impression.

Re-examine the peritoneal relations of the liver. Then examine the

Gall bladder

Cystic duct.

Open the gall bladder and the cystic duct and examine the mucous membrane.

Examine the structures in the transverse fissure

Hepatic artery

Cystic branch

Right and left terminal branches

Hepatic duct

Right and left branches

Portal vein.

Open lengthwise the portion of the vena cava attached to the liver and note the opening of the

Hepatic veins.

Cut through a portion of the liver and observe the vessels. How may a branch of the portal vein be distinguished from one of the hepatic vein?

THE SPLEEN.

Examine its peritoneal relations. Remove it, cutting the splenic artery and vein, and examine its form

Diaphragmatic surface

Gastric surface

Renal surface

Hilus.

Make a section through the spleen and note its colour.

THE KIDNEY.

Examine the position of the kidney with reference to the structures forming the body wall. Dissect away the peritoneum covering them and observe the

Renal fascia, ventral layer

Renal fat body.

Read in your text-book the account of the renal fascia.

Dissect away the fat body and observe the form of the kidney

Suprarenal gland

Hilus of the kidney

Renal artery. Note its mode of distribution to the kidney.

Renal vein

Ureter. Trace its course and relations as far as the brim of the true pelvis.

Remove the right kidney, leaving the left in place; cut the vessels and ureter about 3 cm. from the kidney. Divide the removed kidney longitudinally and parallel to its dorsal surface, cutting along the convex border. Examine the

Cortical substance

Medullary substance

Renal pyramids

Renal papillæ

Renal columns (Columns of Bertini)

Pelvis

Calyces.

DEMONSTRATION V.

The Diaphragm and Dorsal Wall of the Abdomen.

Dissect away the peritoneum from the lower surface of the diaphragm, being careful not to destroy the phrenic arteries and nerves that lie between the two structures. Examine the diaphragm

Its attachments

Crura

Tendinous centre

Aortic opening, giving passage to the aorta, thoracic duct and vena azygos major

Œsophageal opening, giving passage to the œsophagus, and vagus nerves

Foramen for the vena cava

Lateral and medial lumbocostal arches (arcuate ligaments).

Note also the superior epigastric artery passing through the interval between the sternal and costal portions of the diaphragm and the musculophrenic artery piercing the costal attachment opposite the eighth or ninth rib.

Find the greater and lesser splanchnic nerves piercing the crus of the diaphragm and follow them downwards to the

Coeliac (Semilunar) ganglion

Coeliac (Solar) plexus.

Note the plexuses extending from this along each of the arteries arising from the abdominal aorta. At the sides of the bodies of the lumbar vertebræ observe the

Sympathetic trunk, abdominal portion

Lumbar ganglia.

Examine the

Abdominal aorta

Parietal branches

Inferior phrenic

Superior suprarenal

Lumbar

Middle sacral

Visceral branches

Coeliac artery

Left gastric

Hepatic

Splenic

Superior mesenteric

Inferior mesenteric

Middle suprarenal

Renal

Inferior suprarenal

Internal spermatic

Testicular—in male

Ovarian—in female

Common iliac arteries

Vena cava inferior

Common iliac veins

Lumbar veins

Testicular veins—in male

Ovarian veins—in female

Renal veins.

Separate the right crus of the diaphragm from the lumbar vertebræ and draw it aside, exposing the

Receptaculum chyli.

Trace this upwards to the aortic opening of the diaphragm and observe opening into it the

Lumbar lymphatic trunk

Intestinal lymphatic trunk.

Examine the

Iliac fascia.

In exposing this be careful not to injure the genito-femoral (genito-crural) nerve resting on the psoas portion of it and the lateral femoral cutaneous nerve resting on its iliac portion. Note the attachments of its psoas portion and those of the iliac portion and follow it down over the conjoined ilio-psoas muscle to its attachment to the inguinal (Poupart's) ligament and medial to this muscle to the ilio-pectineal eminence. Here it becomes continuous with the pectineal fascia to be examined later. Note that it thus divides the space between the inguinal ligament and the pubic ramus into a *lacuna musculorum* and a *lacuna vasorum*. In the latter locate the position of the

Femoral canal

Lacunar (Gimbernat's) ligament.

Examine the origin of the

Ilio-psoas muscle

Psoas major

Psoas minor

Iliacus.

(Its insertion will be examined later)

Quadratus lumborum.

Carefully shred away the fibres of the psoas muscle of the right side, exposing the lumbar plexus. On the left side follow out the branches of the plexus from where they emerge from the muscle, but do not remove the muscle

Last intercostal nerve

Ilio-hypogastric

Ilio-inguinal

Genito-femoral (Genito-crural)

Lateral femoral (External) cutaneous

Femoral (Anterior crural)

Obturator

Lumbo-sacral trunk.

DEMONSTRATION VI.

The Pelvis.

Divide the body transversely in the line passing through the intervertebral fibrocartilage between the 3rd and 4th lumbar vertebræ, letting both ureters and the left kidney remain in connection with the pelvic organs.

IN THE MALE.

Examine the relations of the pelvic peritoneum, noting the

Mesorectum

Recto-vesical fold

Transverse vesical fold

Pubo-vesical folds

The extent to which the bladder is covered by peritoneum.

Dissect away the peritoneum from the following structures and examine them

External iliac artery and vein

Inferior (Deep) epigastric vessels

Deep circumflex iliac vessels

Hypogastric (Internal iliac) artery and vein

The branches of these will be followed later

Ureter—trace it downwards to the bladder

Ductus (Vas) deferens

Hypogastric plexus of the sympathetic system.

Examine the form and relations of the following organs without disturbing them from their positions at present

Rectum

Bladder

Urachus

Obliterated hypogastric artery.

THE PELVIC FASCIA.

Clean away the fat tissue that has been exposed by the removal of the peritoneum. Separate the bladder from the pubis and clean away the intervening fat. You will thus have exposed the fascia covering the pelvic surface of the pelvic diaphragm, this latter being formed by the piriformis muscle behind, and the coccygeus and levator ani more anteriorly. These last two muscles form the actual floor of the pelvis.

The fascia begins above at the terminal (ilio-pectineal) line, where it is continuous with the lower border of the iliac fascia. Passing downwards it covers the upper part of the lateral and dorsal walls of the pelvis, dorsally covering the piriformis muscle (piriformis fascia) and being reflected upon and continuous with the connective tissue covering the rectum (rectal portion). Laterally it descends as far as a curved line that extends from the body of the pubis to the tip of the spine of the ischium, along which it is thickened to form the *tendinous arch of the pelvic fascia*. At this tendinous arch the fascia may be said to split into two sheets. One of these is continued directly downwards over the surface of the internal obturator muscle and is known as the *obturator fascia* (parietal layer of the pelvic fascia). It will be examined later.

The other sheet, the *endopelvic fascia* (visceral layer of the pelvic fascia) is continued medially over the upper surface of the levator ani muscle. Its more dorsal portion passes beneath the peritoneum of the recto-vesical pouch (recto-vesical portion) and becomes directly continuous with the corresponding portion of the opposite side. More ventrally, as it approaches the middle line, it comes into relation with the bladder and prostate gland, forming a capsule for the latter and being reflected upon the walls of the bladder (vesical portion). Ventral to the neck of the bladder it passes across the median line to become continuous with the corresponding portion of the opposite side and, in doing so, it passes across the gap which exists in the median line between the two levatores ani. Here it comes into relation with and is continuous with the superior layer of the urinogenital trigone (deep layer of the triangular ligament of the perineum) and is pierced by the urethra. The urinogenital trigone will be examined later. From the capsule of the prostate bands of connective tissue extend to the pubis, forming the *pubo-prostatic ligaments*, three of which are recognized, a median and two lateral.

IN THE FEMALE.

Examine the relations of the pelvic peritoneum

Mesorectum

Recto-uterine pouch (Pouch of Douglas)

Recto-uterine folds

Broad ligament of the uterus

Mesometrium

Mesosalpinx

Mesovarium

Vesico-uterine pouch

The extent to which the bladder and uterus are covered by peritoneum.

Dissect away the peritoneum from the following structures and examine them

External iliac artery and vein

Inferior (Deep) epigastric vessels

Deep circumflex-iliac vessels

Hypogastric (Internal iliac) artery and vein

The branches of these will be examined later

Hypogastric plexus.

Examine the form and relations of the pelvic organs in situ

Rectum

Uterus

Vagina—its pelvic portion

Tuba uterina (Fallopian tube)

Isthmus

Ampulla

Abdominal opening

Infundibulum

Fimbriæ

Fimbria ovarica

Ovary.

Examine with the aid of models the normal position and relations of the uterus and ovary. Passing into the broad ligament at the lower part of its lateral free border observe the

Suspensory ligament of the ovary

Ovarian artery.

Trace the course of the latter and also that of the

Uterine artery

dissecting away the anterior layer of the broad ligament over these vessels. In a similar manner expose the

Ovarian ligament

Round ligament of the uterus.

Trace the ureter to the base of the bladder, observing especially its relation to the uterine artery.

Between the layers of the mesosalpinx see if you can find any remains of the

Epoöphoron (Parovarium)

Paroöphoron.

Read in your text-book of Embryology the account of the development of these structures.

Attached to the margin of the mesosalpinx or to one of the fimbriæ observe the

Appendix vesiculosa (Hydatid of Morgagni).

Examine the

Bladder

Urachus

Obliterated hypogastric arteries.

THE PELVIC FASCIA.

The pelvic fascia of the female is essentially like that of the male (see p. 65), the principal difference being that the portion extending across the middle line between the borders of the ventral portions of the levatores ani is pierced by the vagina as well as by the urethra.

Corresponding to the pubo-prostatic ligaments of the male are the pubo-vesical ligaments of the female.

DEMONSTRATION VII.

The Perineum.

Draw the body to the end of the table. Place a block beneath the buttocks; separate the thighs as widely as possible and retain them in that position

Note the position of the following:

Ischial tuberosities

Symphysis pubis

Tip of coccyx.

IN THE MALE

The dissection will be facilitated if a sound be passed through the urethra into the bladder. The rectum may also be distended with tow and the anal orifice closed by sutures. The scrotum should be drawn upwards and retained in that position by being stitched to the most dependent portion of the prepuce.

Make an incision through the skin in the median line, extending from the root of the scrotum to in front of the anus; then continue it around either side of the anus and back to the tip of the coccyx. Make a second incision through the skin at right angles to the first, extending from just in front of one ischial tuberosity to a corresponding point on the opposite side of the median line. Reflect the four flaps of skin thus outlined, being careful to reflect the skin only, leaving intact the

Superficial fascia.

Note that in the dorsal or anal region of the perineum this fascia contains much fat. Over the ischial tuberosities it becomes denser and forms a bursa; open the cavity of the bursa. In the ventral or urinogenital region the fascia contains much less fat and its deeper portion forms a distinct membrane, the *fascia of Colles*, which is continuous with Scarpa's fascia of the lower abdominal wall. Note surrounding the anus the

External sphincter ani muscle.

And to the side of this a deep depression filled with fat, the Ischio-rectal fossa.

Carefully pick away the fat occupying the ischio-rectal fossa, leaving intact the vessels and nerves that traverse it. These are the

Inferior hæmorrhoidal arteries and veins

Inferior hæmorrhoidal nerve.

Trace the inferior hæmorrhoidal artery to its origin from the

Internal pudendal artery

which, accompanied by the corresponding vein and the pudendal nerve, will be found close to the ramus of the ischium, enclosed within a fascial canal, Alcock's canal, lying in the lower edge of the obturator fascia.

Examine the form and boundaries of the ischio-rectal fossa.

Note that it is prolonged ventrally above the urinogenital trigone (triangular ligament), between that structure and the ventral portion of the levator ani. Examine the

Levator ani

Inferior fascia of the pelvic diaphragm, the ischio-rectal (anal) fascia

Obturator internus

Obturator fascia

Tendinous arch of the levator ani (White line) in the angle between the obturator and ischio-rectal fasciæ

Dorsal border of the urinogenital trigone

Gluteus maximus muscle

Sacro-tuberous (Great sacro-sciatic) ligament.

Make an incision through Colles' fascia extending from the median line at the base of the scrotum laterally and dorsally to the ischial tuberosity. Carefully reflect the flaps of the fascia. There is thus exposed the *superficial perineal interspace* between Colles' fascia and the urinogenital trigone. Examine the contents of the interspace

Superficial perineal artery

Perineal nerve

Perineal branch of the posterior femoral cutaneous nerve (Long pudendal nerve)

Superficial transverse perineal muscle

Ischio-cavernosus (Erector penis)

Bulbo-cavernosus (Accelerator urinæ).

Carefully dissect away the ischio-cavernosus and expose, lying beneath it, the

Crus penis

Corpus cavernosum of the penis.

Divide the bulbo-cavernosus along the median line and reflect it. This will expose the

Bulb of the urethra

Corpus cavernosum of the urethra (Corpus spongiosum).

Detach the crus penis from the rami of the pubis and ischium and turn it aside, being careful not to injure the fascia immediately beneath it. This is the

Superficial layer of the urinogenital trigone (triangular ligament).

Examine the attachments of this and note that it is pierced by the urethra and by blood vessels passing to the bulb and to the corpus cavernosum of the penis, and ventrally by the dorsal artery, vein and nerve of the penis.

Remove the superficial layer of the trigone. This will expose the *deep perineal interspace*, enclosed between the two layers of the trigone. Examine its contents

Deep transverse muscle of the perineum

Sphincter of the membranous urethra (Constrictor urethræ)

Membranous portion of the urethra

Bulbo-urethral gland (Cowper's gland)

Artery and vein of the penis

Artery of the bulb

Urethral artery

Deep artery of the penis

Dorsal artery of the penis

Pudendal nerve

Dorsal nerve of the penis.

Beneath these structures lies the

Deep layer of the urinogenital trigone.

This is pierced by the membranous portion of the urethra.

Review its relations to the endopelvic fascia.

IN THE FEMALE

Examine the external genitalia

Mons pubis (Mons Veneris)

Labia majora

Labia minora

Frenulum (Fourchette)

Fossa navicularis

Vestibule

Orifice of the vagina

Hymen or Carunculæ hymenales (myrtiformes)

Orifice of urethra

Clitoris.

Read the account of the development of the external genitalia in your text-book of Embryology.

The dissection of the female perineum will be facilitated if the rectum be moderately distended with tow. Close the anal orifice by sutures and suture together the two labia majora so as to close in the vestibule. Make an incision through the skin encircling closely the vulvar fissure, thence dorsally in the median line to the margin of the anus; carry it around that orifice on either side and then dorsally to the tip of the coccyx. A second incision should now be made at right angles to the first, from one ischial tuberosity to the other passing in front of the anus. Reflect the four flaps of skin thus outlined and so expose the

Superficial fascia.

Note that in the dorsal or anal region of the perineum this fascia contains much fat. Over the ischial tuberosities it becomes denser and forms a bursa; open the cavity of the bursa. In the ventral or urinogenital region it contains less fat and its deeper portion forms a distinct membrane, the *fascia of Colles*, which is continuous with Scarpa's fascia of the abdominal wall. In the region of the labia majora the fascia contains muscular fibres, the dartos. Note surrounding the anus the

External sphincter ani muscle.

And to the side of this a deep depression filled with fat, the Ischio-rectal fossa.

Carefully pick away the fat occupying the fossa, leaving intact the vessels and nerves that traverse it. These are the

Inferior hæmorrhoidal arteries and veins

Inferior hæmorrhoidal nerve.

Trace the inferior hæmorrhoidal artery to its origin from the Internal pudendal artery

which, accompanied by the corresponding vein and the pudendal nerve, will be found close to the ramus of the ischium, enclosed in a fascial canal, Alcock's canal, lying in the lower edge of the obturator fascia.

Examine the form and boundaries of the ischio-rectal fossa. Note that it is prolonged ventrally above the urinogenital trigone (triangular ligament), between that structure and the ventral portion of the levator ani. Examine the

Levator ani

Inferior fascia of the pelvic diaphragm, the ischio-rectal fascia (anal fascia)

Obturator internus

Obturator fascia

Tendinous arch of the levator ani (White line), in the angle between the obturator and ischio-rectal fasciæ

Dorsal border of the urinogenital trigone (triangular ligament of the perineum)

Gluteus maximus

Sacro-tuberous (Great sacro-sciatic) ligament.

Make an incision through Colles' fascia extending from the middle line laterally and dorsally to the ischial tuberosity. Carefully reflect the flaps of the fascia. There is now exposed the *superficial perineal interspace* between Colles' fascia and the urinogenital trigone. Examine the contents of the interspace

Superficial perineal artery

Perineal nerve

Perineal branch of the posterior femoral cutaneous nerve (Long pudendal nerve)

Superficial transverse perineal muscle

Bulbo-cavernosus (Sphincter vaginæ)

Ischio-cavernosus (Erector clitoridis).

Detach the three muscles just named and observe the

Bulb of the vestibule.

Pars intermedia

Crus clitoridis

Corpora cavernosa clitoridis.

Remove the sutures closing the vestibule and carefully detach the crus clitoridis from its attachment to the ramus of the ischium, being careful to preserve, if possible, the vessels and nerves lying beneath it. This will expose the

Superficial layer of the urinogenital trigone (triangular ligament).

Examine the attachment of this and note that it is pierced by the urethra and the vagina, by vessels passing to the bulbus vestibuli and to the corpus cavernosum clitoridis and, ventrally, by the dorsal artery, vein and nerve of the clitoris.

Remove the superficial layer of the trigone. This will expose the *deep perineal interspace* enclosed between the layers of the trigone. Examine its contents

Deep transverse muscle of the perineum

Sphincter of the membranous urethra (Constrictor urethræ)

Membranous portion of the urethra

Greater vestibular gland (Gland of Bartholin)

Artery and vein of the clitoris

Artery of the bulb

Urethral artery

Deep artery of the clitoris

Dorsal artery of the clitoris

Dorsal nerve of the clitoris.

Beneath these structures lies the

Deep layer of the urinogenital trigone.

This is pierced by the membranous portion of the urethra and by the vagina. Review its relations to the endopelvic fascia.

DEMONSTRATION VIII.

The Pelvic Viscera.

Separate the penis (clitoris in the female) from the pubic arch; divide the transversus perinei and the levator ani close to their origins and the urinogenital trigone close to its attachment. Divide the spermatic cord (round ligament in the female) at the subcutaneous inguinal ring and remove the organs of reproduction, rectum and bladder, with the remaining kidney and the ureters attached, dividing the blood vessels passing to the pelvic viscera some distance from their origins from the hypogastric (internal iliac) vessels.

Separate the rectum from the other organs, wash it out and open it by a longitudinal incision along its ventral wall. Observe the

Rectal columns and sinuses

Annulus hæmorrhoidalis

Transverse folds (Valves of Houston)

Internal sphincter ani.

Review the blood supply of the rectum.

THE MALE REPRODUCTIVE ORGANS AND BLADDER.

Follow the ductus deferens or ureter to the base of the bladder, dissecting away the loose tissue about the base and neck of the organ so as to expose the structures in that region. Examine the

- Ureter—lower portion
- Ductus (Vas) deferens
- Seminal vesicles
- Ejaculatory duct
- Prostate gland.

Examine the urinary bladder as to its form—apex, fundus, neck—and open it by an incision in the median line of its ventral wall extending from the apex to the neck. Continue the incision onward upon the penis so as to lay open the urethra along its entire length. Observe the

- Mucous membrane of the bladder
- Orifices of the ureters
- Ureteric fold
- Trigone
- Internal orifice of the urethra
- Prostatic portion of the urethra
 - Urethral crest
 - Colliculus seminalis (Verumontanum)
 - Prostatic utricle (Sinus pocularis or Uterus masculinus)
- Membranous portion of the urethra
- Cavernous (Spongy) portion of the urethra
 - Openings of the bulbo-urethral glands
- Urethral lacunæ
- Navicular fossa.

Examine the structure of the penis

- Integument
 - Prepuce
- Corpora cavernosa penis
- Corpus cavernosum urethræ (Corpus spongiosum)
 - Bulb
 - Glans penis.

Make a transverse section through the penis at about its middle and note the arrangement of the parts composing it

Integument

Dorsal vein

Dorsal arteries and nerves

Corpora cavernosa penis

Capsule

Septum

Corpus cavernosum urethræ

Urethra.

Examine the

Scrotum

Raphe.

Read in your text-book the description of the structure of the scrotum. Open it by a longitudinal incision along its ventral wall and observe

Tunica vaginalis—parietal layer. Note its reflection upon the testis to form the visceral layer

Testis—its form

Epididymis

Head (Globus major)

Body

Tail (Globus minor)

Digital fossa

Appendix testis.

Read in your text-book the description of the structure of the testis. Also read in your text-book of Embryology the account of the development of the reproductive organs.

Dissect the coverings and components of the

Spermatic cord

External spermatic fascia

Cremasteric fascia

Cremasteric muscle

Vaginal process of the fascia transversalis

Ductus (Vas) deferens

Deferential artery

Internal spermatic artery

Pampiniform plexus of veins.

THE FEMALE REPRODUCTIVE ORGANS AND BLADDER.

Examine the urinary bladder as to its form—apex, fundus, neck. Trace downward to its attachment to the bladder the Ureter, pelvic portion.

Open the bladder by an incision in the median line of its ventral surface, extending from the apex to the neck, and continue the incision so as to lay open the urethra throughout its entire length. Note the close relation of the urethra to the anterior wall of the vagina and examine the

Mucous membrane of the bladder

Orifices of the ureters

Ureteric fold

Trigone

Internal orifice of the urethra

External orifice of the urethra.

Examine the

Uterus

Fundus

Body

Neck—supravaginal portion

Perimetrium

Parametrium

Vagina.

Note its relations to the bladder. Open it by an incision extending along its right wall and examine the

Mucous membrane

Rugæ

Columns of the rugæ

Urethral carina

Fornix—anterior and posterior

Neck of the uterus—vaginal portion

External orifice of the uterus (External os uteri).

Cut away the vagina from the uterus and open the latter by a longitudinal incision through the ventral wall, extending from the fundus to the external orifice, and by a transverse incision from the upper end of the first to the openings of the uterine (Fallopian) tubes. Observe the

Cavity of the uterus

Internal orifice of the uterus (Internal os uteri)

Canal of the neck

Palmate folds

Examine the

Ovary

The surface of the ovary is smooth up to puberty; after that it is scarred from the rupture of Ovarian follicles. Make a section through the ovary and note the

Stroma

Ovarian (Graafian) follicles

Corpus luteum } if present

Corpus albicans }

Lay open the uterine (Fallopian) tubes throughout their length and note the

Tubal folds

Uterine orifices.

DEMONSTRATION IX.

The Pelvic Walls.

Saw through the symphysis pubis and the sacrum and coccyx in the median line. Clean the hypogastric (internal iliac) artery and its branches

Parietal branches

Iliolumbar

Iliac branch

Lumbar branch

Lateral sacral

Superior gluteal

Inferior gluteal (Sciatic)

Obturator

Pubic branch

Visceral branches

Umbilical

Superior vesical branches

Inferior vesical

Uterine—in female

Middle hæmorrhoidal

Internal pudendal.

Identify the corresponding veins, and read in your text-book the accounts of the venous plexuses from which the visceral venous branches arise. Examine the

Hypogastric (Internal iliac) vein.

Examine the pelvic portion of the

Obturator nerve.

Clean and examine the

Sacral plexus

Fifth lumbar nerve

Lumbosacral trunk

Sacral nerves I-III

Superior gluteal

Inferior gluteal

Branches to the piriformis

Posterior femoral cutaneous (Small sciatic)

Sciatic

Pudendal plexus

Sacral nerves IV and V

Coccygeal nerve

Middle hæmorrhoidal nerves

Pudendal nerve

Branches to the coccygeus

Sympathetic trunk—pelvic portion

Sacral ganglia

Ganglion impar.

Examine the muscles of the pelvic wall, the

Piriformis—its insertion will be studied later

Coccygeus

Internal obturator—its insertion will be studied later.

DEMONSTRATION X.

The Gluteal Region.

Make an incision through the skin from the tip of the coccyx downwards and laterally over the back of the thigh, and terminating about 10 cm. below the great trochanter. Dissect away the flap of skin, exposing the

Superficial fascia.

Note that it contains a considerable amount of fat. Work off the fascia, as far as possible, with the handle of your scalpel or a probe, and observe the following cutaneous nerves

Middle clunial nerves—piercing the deep fascia on a line extending from the posterior superior spine of the ilium to the tip of the coccyx

Superior clunial nerves—crossing the iliac crest lateral to the lateral margin of the sacrospinalis muscle

Lateral cutaneous branch of the ilio-hypogastric, crossing the iliac crest about 6 cm. from the anterior superior spine

Inferior clunial nerves—curving around the lower border of the gluteus maximus.

Examine the

Deep fascia. Note that it is comparatively thin over the gluteus maximus, but becomes thicker over the exposed surface of the gluteus medius and is continued as a thick layer beneath the gluteus maximus.

Carefully dissect away the deep fascia covering the gluteus maximus, beginning at its attachment to the crest of the ilium.

Examine the

Gluteus maximus.

Detach the muscle from its attachment to the ilium. Then proceed to detach it from the sacrum, being careful not to injure the gluteal vessels emerging from the greater sciatic foramen immediately beneath it; then separate it from the sacro-tuberous ligament. Separate the inferior clunial nerves and turn them downwards, so that they may later be traced to their origin, and then carefully raise the muscle and note the vessels and nerves entering its lower surface. These are

Twigs from the superior gluteal artery

Branches from the inferior gluteal (sciatic) artery

Inferior gluteal nerve.

Clean these structures, tracing them into the muscle and then dissect them away from the main mass of the muscle, leaving a small portion of it, however, attached to each. The muscle may now be reflected downwards and outwards. Observe the

Trochanteric bursa—between the tendon of the muscle and the great trochanter

Gluteo-femoral bursa—immediately below this.

Dissect away the dense fascia covering the gluteus medius and examine the

Gluteus medius

Tensor fasciæ latæ

Piriformis

Tendon of the obturator internus

Gemellus superior

Gemellus inferior

Quadratus femoris.

Issuing from the greater sciatic foramen above the piriformis observe the

Superior gluteal artery

Superior gluteal nerve.

Below the piriformis observe the

Inferior gluteal (Sciatic) artery

Inferior gluteal nerve

Sciatic nerve

Posterior femoral cutaneous (Lesser sciatic) nerve

Internal pudendal artery

Pudendal nerve

Nerve to the internal obturator

these last three structures passing over the spine of the ischium to enter the ischio-rectal fossa through the lesser sciatic foramen.

Detach the two gemelli from their origin and reflect them laterally and detach the quadratus femoris from its attachment to the femur and reflect it medially. This will expose the

Nerve to the quadratus femoris

Tendon of the obturator externus

Terminal branches of the medial femoral circumflex artery.

Separate the gluteus medius from the underlying gluteus minimus by passing the hand under the posterior border of the former and, when the separation is completed, divide the gluteus medius about 5 cm. above the great trochanter and reflect the two portions upwards and downwards. Between the tendon of insertion of the muscle and the great trochanter note the

Posterior bursa of the gluteus medius.

Examine the

Superior gluteal artery

Superior branch

Inferior branch

Superior gluteal nerve

Branch to the tensor fasciæ latæ

Gluteus minimus.

Clean away any muscle tissue that may still be attached in the neighbourhood of the sacro-iliac articulation and examine the

Ilio-lumbar ligament

Anterior sacro-iliac ligament

Posterior sacro-iliac ligament

Interosseous sacro-iliac ligament.

Divide the ligaments and examine the

Synovial cavity.

Review in detail the osteology of the sacrum, os innominatum and the pelvis as a whole.

DEMONSTRATION XI.

The Popliteal Region and the Back of the Thigh.

Make an incision through the skin over the popliteal region, extending in the median line from a point about 12 cm. above to about 10 cm. below the knee joint. From each extremity of this make another incision extending transversely about half-way around the leg. Reflect the two flaps of skin and observe the

Superficial fascia.

Remove the superficial fascia, as far as possible with the handle of your scalpel or a probe, and observe in it the

Branches of the posterior femoral cutaneous nerve

Small saphenous vein.

Examine the deep popliteal fascia, carefully dissect it away and examine the boundaries of the popliteal fossa

Biceps femoris

Semitendinosus

Semimembranosus

Gastrocnemius

Lateral head

Medial head

Plantaris.

Remove the fat that occupies the fossa and examine its contents

Posterior femoral cutaneous nerve

Tibial (Internal popliteal) nerve

Medial sural cutaneous (Communicans tibialis)

Muscular branches to the gastrocnemius, plantaris
and soleus

Articular branches

Common peroneal (External popliteal) nerve

Lateral sural cutaneous (Communicans fibularis)

Peroneal anastomatic branch

Popliteal veins

Small saphenous vein

Popliteal artery

Lateral superior artery of the knee

Medial superior artery of the knee

Middle artery of the knee

Lateral inferior artery of the knee

Medial inferior artery of the knee

Sural arteries

Branch of the obturator nerve.

Examine the floor of the popliteal fossa

Popliteal surface of the femur

Oblique popliteal ligament (Posterior ligament of the knee
joint)

Popliteal muscle.

THE BACK OF THE THIGH.

Make an incision through the skin of the back of the thigh in
the median line and reflect the flaps of skin, exposing the

Superficial fascia.

In this note the following cutaneous nerves

Branches of the posterior femoral cutaneous

Branches of the lateral femoral cutaneous.

Clean away the superficial fascia and examine the

Fascia lata.

Remove this, being careful not to injure the posterior femoral cutaneous nerve that lies immediately beneath it in the median line. Clean and examine the

Posterior femoral cutaneous nerve
Biceps femoris
Semitendinosus
Semimembranosus
Sciatic nerve
Perforating arteries.

DEMONSTRATION XII.

The Front and Inner Side of the Thigh ; the Hip Joint.

Make an incision through the skin extending from the medial end of the inguinal (Poupart's) ligament to a point over the medial condyle of the tibia and from the lower end of this make a transverse incision across the front of the leg to the lateral condyle of the tibia. Reflect the skin laterally, exposing the

Superficial fascia.

In this note the following

Subcutaneous præpatellar bursa
Inguinal lymphatic nodes
Great saphenous vein
Ilio-inguinal nerve
Lumbo-inguinal (Crural) branch of the genito-femoral nerve
Anterior cutaneous branches of the femoral nerve
Lateral femoral cutaneous nerve.

Clean away the superficial fascia, leaving intact the great saphenous vein and the cutaneous nerves, and examine the

Fascia lata

Fossa ovalis (Saphenous opening)
Falciform margin of the fossa ovalis (Iliac portion of the fascia lata)
Cribriform fascia
Ilio-tibial band.

Divide the falciform margin of the fossa ovalis and separate the

fascia lata from its attachment to the inguinal ligament to within 2 cm. of the anterior superior spine of the ilium. Dissect away the cribriform fascia, the fat and the deep inguinal lymph nodes from the sheath of the femoral vessels and observe the

Pectineal fascia (Pubic layer of the fascia lata) passing beneath the femoral sheath. Examine the *femoral sheath* and note its contents, the

Femoral nerve

Femoral artery

Femoral vein

Femoral canal.

Remove the fascia lata from the anterior surface of the upper third of the thigh, exposing the

Femoral trigone (Scarpa's triangle).

Examine its boundaries

Sartorius—laterally

Adductor longus—medially

Inguinal ligament—above

Adductor brevis, pectineus and ilio-psoas—in the floor.

Clean the contents of the space

Femoral (Anterior crural) nerve. Follow its branches within the limits of the trigone

Femoral artery

Superficial epigastric

Superficial circumflex iliac

External pudendals

Profunda femoris

Medial circumflex

Lateral circumflex.

Femoral vein

Great saphenous vein

Lumbo-inguinal branch of the genito-femoral nerve

Lateral femoral cutaneous nerve.

Remove the fascia lata from the remainder of the thigh, leaving the ilio-tibial band in place. Re-examine the tensor fasciæ latæ, noting, however, that it properly belongs to the gluteal set of muscles. Clean and examine the

Sartorius.

Divide the sartorius at about its middle and reflect the two ends. This will expose the *adductor* (Hunter's) *canal*. Note its boundaries

Vastus medialis—laterally
Adductor magnus—medially
Sartorius—superficially.

Open the canal and examine the

Saphenous nerve
Femoral vein
Femoral artery

Highest artery of the knee (Anastomotica magna)

Saphenous (Superficial) branch

Muscular (Deep) branch

Tendinous hiatus of the adductor magnus.

Clean and examine the muscles on the front of the thigh, noting the nerves supplying each.

Quadriceps femoris

Rectus femoris.

Cut across the ilio-tibial band and reflect the tensor fasciæ latæ upwards. Cut and reflect the gluteus minimus so as to expose the reflected tendon of the rectus. Then divide the rectus at about its middle and reflect the two ends.

Vastus lateralis

Vastus intermedius

Vastus medialis.

Make a vertical incision through the vastus intermedius so as to expose the

Articularis genu (Subcrureus) muscle.

Trace the course of the

Lateral circumflex artery

Ascending branch.

THE INNER SIDE OF THE THIGH.

Examine the

Adductor longus.

Divide the adductor longus near its origin and reflect it

laterally, being careful not to injure the anterior branch of the obturator nerve which lies beneath it. Examine the

Profunda femoris artery

Perforating arteries

Pectineus.

Detach the pectineus from its origin and reflect it downwards and laterally. Observe the

Internal circumflex artery—its terminal branches have already been examined in the dissection of the gluteal region

Adductor brevis.

Divide this muscle close to its origin and reflect it downwards and laterally. Examine the

Obturator nerve

Anterior branch

Posterior branch

Articular branch to the knee joint

Gracilis

Adductor magnus

Adductor minimus.

Detach the adductor minimus and adductor magnus from their origins so as to expose the

Obturator externus

Obturator artery

Ilio-psoas muscle—lower portion.

THE HIP JOINT.

Divide the femoral vessels and nerve and turn them downwards. Detach the tendon of the ilio-psoas from its insertion and reflect the muscle upwards. Note the *ilio-pectineal bursa* between the tendon and the articular capsule of the hip joint which is now exposed. Examine the

Articular capsule

Ilio-femoral ligament

Pubo-capsular ligament

Ischio-capsular ligament

Orbicular zone.

Open the cavity of the joint by cutting through the capsule in its upper part and reflecting it downwards. Observe the

Glenoidal lip (Cotyloid ligament)

Transverse ligament

Ligamentum teres

Synovial membrane.

Review osteology of the Femur and its ossification.

DEMONSTRATION XIII.

The Anterior Tibial, Peroneal and Dorsal Pedal Regions.

Make an incision through the skin down the front of the leg in the median line and extending along the dorsum of the foot to the base of the great toe. Make also transverse incisions across the ankle and across the bases of the toes. Reflect the four flaps thus outlined and examine the

Superficial fascia.

Dissect out from this the following structures

Long saphenous vein

Dorsal venous arch of the foot

Saphenous nerve

Infrapatellar branch

Superficial peroneal (Musculo-cutaneous) nerve

Medial dorsal cutaneous nerve of the foot

Intermediate dorsal cutaneous nerve of the foot

Branch of the sural (short saphenous) nerve.

Carefully remove the superficial fascia, leaving behind the structures already dissected out from it, and examine the

Crural fascia

Dorsal fascia of the foot

Transverse crural ligament (Upper part of the anterior annular ligament)

Cruciate ligament (Lower part of the anterior annular ligament)

Superior peroneal retinaculum (External annular ligament).

Divide the crural fascia longitudinally by a median incision, leaving the transverse crural and the cruciate ligaments intact, however, and reflect it laterally and medially. In the upper part

of the leg it will be found closely adherent to the subjacent muscles; where this is the case do not remove the fascia. Note that it becomes continuous with the periosteum of the tibia and that laterally a sheet extends from its deeper surface to be attached to the fibula, the *anterior intermuscular septum*. Dissect away also the dorsal fascia of the foot, being careful not to injure the cutaneous nerves already exposed. Examine the

- Tibialis anterior
- Extensor digitorum longus
- Peroneus tertius
- Extensor hallucis longus.

Clean away the crural fascia from over the peroneal muscles, retaining, however, the superior peroneal retinaculum. Note the *posterior intermuscular septum* and examine the

- Peroneus longus. Follow the tendon to the lateral surface of the cuboid. Its further course will be traced later.
- Peroneus brevis.

Note the arrangement of the tendon sheaths around the ankle joints.

Separate the tibialis anterior and the extensor digitorum longus and examine the

- Anterior tibial artery
 - Anterior tibial recurrent
 - Lateral anterior malleolar
 - Medial anterior malleolar
- Deep peroneal (Anterior tibial) nerve.

Trace the artery and nerve upon the dorsum of the foot. The artery becomes the

- Dorsalis pedis
 - Lateral tarsal artery
 - Medial tarsal arteries
 - Arcuate (Metatarsal) artery
 - Second to fourth dorsal metatarsal (interosseous) arteries
 - Digital branches
 - First dorsal metatarsal (interosseous) artery
 - Digital branches
 - Deep plantar (Communicating) branch.

The nerve accompanies the dorsalis pedis on its medial side and divides over the first intermetatarsal space into the *digital nerves* for the adjacent surfaces of the first and second toes.

Find the common peroneal nerve as it winds around the neck of the fibula. Detach the peroneus longus from its origin so as to follow the nerve beneath that muscle, where it will be found to divide into the

Superficial peroneal (Musculo-cutaneous) nerve

Deep peroneal (Anterior tibial) nerve.

Follow the deep peroneal nerve through the extensor digitorum longus; beyond this point it has already been exposed. Follow the superficial peroneal nerve through the peroneus longus until it reaches the interval between the two peroneal muscles. Follow it downwards. Its terminal cutaneous branches have already been exposed.

Draw aside the peroneus tertius and observe perforating the interosseous membrane the

Anterior peroneal artery.

On the dorsum of the foot examine the

Extensor digitorum brevis.

DEMONSTRATION XIV.

The Posterior Tibial and Plantar Regions.

Make an incision through the skin extending along the median line of the back of the leg as far as the extremity of the heel. Make a second incision transversely at the lower end of this, extending along each side of the foot for about 5 cm. Reflect the two flaps of skin thus outlined and examine the

Superficial fascia

Long saphenous vein

Short saphenous vein

Medial sural cutaneous nerve (Communicans tibialis)

Lateral sural cutaneous nerve (Communicans fibularis)

Sural (External saphenous) nerve.

Remove the superficial fascia, leaving intact the structures just exposed. Examine the

Crural fascia of the back of the leg

Laciniate (Internal annular) ligament.

Divide the crural fascia by incisions similar to those made in removing the skin and reflect it. Do not injure the *laciniate ligament*. Examine the

Gastrocnemius.

Divide the gastrocnemius at about the middle of its length and reflect its upper part upwards. Note beneath its medial head the *medial gastrocnemial bursa* and see if the lateral head contains a sesamoid cartilage or bone, the *fabella*. Examine the

Plantaris

Soleus

Calcaneal tendon (Tendo Achillis).

Detach the plantaris from its origin and reflect it downwards. Divide the soleus just above its union with the gastrocnemius and reflect the calcaneal tendon downwards, noting the *bursa of the calcaneal tendon*. Divide the soleus muscle longitudinally in the middle line, noting the tendinous arch from which its fibres arise, and reflect the two halves laterally and medially. Observe the deep layer of the crural fascia covering the deep layer of muscles. Remove this and examine the

Popliteal artery—terminal portion

Anterior tibial artery—origin

Posterior tibial recurrent

Posterior tibial artery

Peroneal artery—origin

Muscular branches

Medial posterior malleolar

Medial calcaneal

Tibial nerve

Muscular branches.

Note the strong fascia covering the popliteal muscle and descending upon it, observe the nerve to the popliteus muscle. Examine the

Popliteus

Flexor digitorum longus

Flexor hallucis longus

Tibialis posterior.

The insertions of the last three will be examined later. Note the structures passing beneath the laciniated ligament and their relative positions. Note the arrangement of the tendon sheaths. Detach the flexor hallucis longus from its origin and examine the

Peroneal artery

Muscular branches

Lateral posterior malleolar

Lateral calcaneal

Calcaneal rete.

Running downward on the interosseous membrane is the *crural interosseous nerve*, a branch of the nerve to the popliteus or of one of the other muscular branches of the tibial nerve.

THE PLANTAR REGION.

Remove the skin from the plantar surface of the foot and from the flexor surfaces of the toes. Examine the structure of the *superficial fascia* and remove it, noting the *subcutaneous calcaneal bursa*. Examine the

Plantar aponeurosis.

Remove this and examine the

Flexor digitorum brevis

Abductor hallucis

Abductor digiti quinti.

Divide the flexor digitorum brevis and separate the abductor hallucis from its origin. Examine the

Medial plantar artery

Lateral plantar artery

Medial plantar nerve

Plantar digital nerves

Lateral plantar nerve

Superficial branch

Plantar digital nerves.

Separate the abductor digiti quinti from its origin and reflect it distally. Examine the

Quadratus plantæ

Tendon of the flexor hallucis longus

Tendons of the flexor digitorum longus

Lumbricals.

Separate the quadratus plantæ from its origin and draw it out from beneath the lateral plantar artery and nerve. Divide the tendons of the flexor hallucis longus and flexor digitorum longus where they emerge from under the laciniated ligament. Divide the medial plantar nerve near its origin and draw it aside. Reflect the long flexor tendons, quadratus plantæ and lumbricals distally, observing the nerve supply of the lumbricals as they are raised. Examine the

Flexor hallucis brevis

Sesamoid bones

Adductor hallucis

Oblique head

Transverse head

Detach the flexor hallucis brevis and the oblique head of the adductor hallucis from their origins and reflect them distally. Examine the

Plantar arch

Plantar metatarsal (digital) arteries

Perforating branch

Plantar digital branches

Deep branch of the lateral plantar nerve.

Separate the transverse head of the adductor hallucis from its origin and reflect the muscle medially. Examine the

Interosseous muscles

Flexor digiti quinti brevis

Tendon of the tibialis posterior

Tendon of the peroneus longus.

Review osteology of Tibia and Fibula and their ossification.

DEMONSTRATION XV.

The Knee Joint, Ankle Joint and Tarsal Articulations.

THE KNEE JOINT.

Remove the popliteal vessels and the tibial and peroneal nerves. Leave the tendons of the muscles surrounding the knee joint, but remove the popliteus, and divide the tendon of the quadriceps femoris about 8 cm. above the patella. Examine the

Articular capsule

- Fibular collateral (Long external lateral) ligament
- Tibial collateral (Internal lateral) ligament
- Oblique popliteal (Posterior) ligament
- Arcuate popliteal ligament
- Patellar ligament.

Make a vertical incision through the articular capsule on either side of the patella and patellar ligament and turn the tendon of the quadriceps femoris and the patella downwards. Examine the

- Lateral meniscus (External semilunar cartilage)
- Medial meniscus (Internal semilunar cartilage)
- Transverse ligament
- Crucial ligaments
- Patellar synovial fold (Ligamentum mucosum)
- Alar folds.

Examine the extent of the synovial cavity, noting its usual continuity with the suprapatellar bursa above and with the popliteal bursa. Note also the inferior compartment beneath the menisci.

THE SUPERIOR TIBIO-FIBULAR ARTICULATION.

Examine the

- Articular capsule
- Anterior ligament of the head of the fibula
- Posterior ligament of the head of the fibula.

THE INFERIOR TIBIO-FIBULAR ARTICULATION.

Examine the

- Interosseous membrane
- Anterior ligament of the lateral malleolus
- Posterior ligament of the lateral malleolus.

Note that this articulation is a syndesmosis.

THE ANKLE JOINT.

Remove the soft parts from around the articulation, being careful not to injure the articular capsule, especially its anterior portion. Examine the

Articular capsule

Deltoid ligament (Internal lateral ligament)

Anterior talo-fibular ligament

Posterior talo-fibular ligament

Calcaneo-fibular ligament.

Make horizontal incisions through the anterior and posterior portions of the articular capsule and examine the synovial cavity. Note its extension upwards between the lower ends of the tibia and fibula.

THE TRANSVERSE TARSAL JOINT.

Review the osteology of the tarsal bones.

Clean away the soft parts from the dorsum of the foot and separate the foot from the tibia and fibula.

Clean away the soft parts from the plantar region, cutting the tendons of the tibialis posterior and peroneus longus so as to leave their plantar portions in place. Examine the

Long plantar ligament.

Detach the long plantar ligament from its attachment to the calcaneus and reflect it, exposing the

Plantar calcaneo-cuboid (Short plantar) ligament.

Examine the *transverse tarsal joint* (Chopart's articulation), consisting of the talo-calcaneo-navicular and the calcaneo-cuboid articulations. Divide the dorsal ligaments extending between the talus and calcaneus and examine the talo-calcaneal articulation.

Articular capsule

Interosseous ligament.

Examine the calcaneo-cuboid articulation

Dorsal (Lateral) calcaneo-cuboid ligament

Bifurcate ligament (Dorsal calcaneo-cuboid and calcaneo-scaphoid ligaments).

Divide the dorsal cuneo-navicular ligaments and those extending between the cuneiform bones and between the third cuneiform and the cuboid. Examine the *intercuneiform* and the *cuneo-cuboid interosseous ligaments* and the synovial cavity.

THE TARSO-METATARSAL ARTICULATIONS.

These articulations together constitute Lisfranc's articulation; note its line. Divide the dorsal ligaments and bending the metatarsals downwards examine the joint cavities (1) between the first cuneiform and the first metatarsal, (2) one between the second and third cuneiforms and the corresponding metatarsals, this cavity also passing between the cuneiforms and forming the cuneonavicular cavity, (3) one between the fourth and fifth metatarsals and the cuboid. Observe the interosseous ligaments of the bases of the metatarsals.

THE METATARSO-PHALANGEAL ARTICULATIONS.

Examine the metatarso-phalangeal articulation of the third toe

Articular capsule

Collateral ligaments

Plantar accessory ligament

Transverse capitular ligament.

THE INTERPHALANGEAL ARTICULATIONS.

Examine one of the interphalangeal articulations. Note the

Articular capsule

Collateral ligaments.

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